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## THE RELATIONSHIP BETWEEN BODY BUILD AND PHYSIOLOGICAL CHARACTERS IN UNIVERSITY STUDENTS

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The idea that the general build of the body is significant in medicine dates back to ancient times, as shown by the terms "habitus phthisicus" and "habitus apoplecticus." This doctrine was somewhat overshadowed by the rise of bacteriology during the past half century, but has recently been revived and is now being actively studied in relation to various phases of medicine. Clinical statistics and life insurance records seem to indicate that the body build, especially the height-weight ratio, shows a definite relation to mortality and predisposition to certain forms of disease. However, much of the medical literature on this subject lacks critical analysis and appears merely suggestive rather than conclusive in character.

If the bodily habitus in general has any such important significance, it has seemed to the writer that it should be possible to demonstrate definite correlations between the body build and the fundamental physiological characters which are concerned in disease. The present study was therefore undertaken, based upon the records of the University Health service for 1,633 young men entering the University of Minnesota during the year 1924-25. The available data include the age, stature, sitting height, body weight, chest girth, chest expansion, vital capacity, pulse rate, blood pressure and Schneider's cardiovascular rating. The methods used were in general those outlined in Pearl's "Medical Biometry and Statistics." The averages for the present group, together with the coefficients of variation, are shown in Table 1. The statistical details of this study and the discussion of the

literature will be published elsewhere. Some of the more general conclusions are presented here.

The student group averaged about 20 years of age, 68.7 inches in height, and 141.4 pounds in weight. To measure the body build, the weight:height<sup>2</sup> index was used, the weight in pounds being divided by the square of the stature in inches; and the quotient being multiplied by 1,000 to form a convenient integer. The average index of build for the student group is about 30, which indicates a rather slender habitus. In general, the evidence from the frequency distribution of cases indicates that in the present group there is only a single true type of body build, with gradually decreasing frequency from the medium build toward the slender extreme on the one side and the stout on the other. There are no distinct groups of individuals of "hypersthenic," "sthenic," "hyposthenic" or "asthenic" types.

Since the stature remains fairly constant according to age in the present group, while the body weight appears progressively greater with age, it follows that the body build is positively correlated with age. That is, the older individuals tend to have a higher index of body build. The same is true for the (quiet) chest girth, as might be expected. The chest expansion, on

TABLE I

Average Data for 1,633 Male Students Entering the University of Minnesota During the Year 1924-25.

	Mean, and probable error	Coefficient of variation
Age .....	20.078 ± .046 yrs.	13.71%
Stature .....	68.684 ± .042 in.	3.66%
Sitting height .....	35.012 ± .022 in.	3.78%
Body weight .....	141.44 ± .29 lbs.	12.27%
Weight: height <sup>2</sup> index of build.....	29.962 ± .054	10.66%
Chest circumference .....	34.857 ± .035 in.	5.99%
Chest expansion .....	2.904 ± .014 in.	28.75%
Vital capacity .....	4383 ± 11 c.c.	14.54%
Pulse rate .....	80.177 ± .204	15.11%
Systolic blood pressure.....	124.28 ± .21 mm. Hg.	9.88%
Cardiovascular rating.....	9.995 ± .072	41.47%

the other hand, shows no definite correlation with body build. Slimness or stoutness, as such, does not seem to affect appreciably the amount of chest expansion (as measured with the tape line at nipple level).

The correlation between chest expansion and vital capacity was also studied. The coefficient of correlation between these two characters is  $+0.351 \pm 0.015$ . This is only a very moderate degree of correlation (perfect correlation being 1.00). The relationship between chest expansion and vital capacity is much less close than that, for example, between stature and body weight, whose coefficient of correlation in the present series is  $+0.50$ .

The correlation between chest expansion and vital capacity is a matter of some practical importance. The chest expansion (difference in chest girth between extreme expiration and extreme inspiration) is still used by the great majority of the medical profession as a measure of the efficiency of the respiratory mechanism. It is the method prescribed in examinations for life insurance, admission to the army and navy, etc. Although various authors have criticised the use of chest expansion as a respiratory test, the present study is apparently the first statistical demonstration of its unreliability by direct comparison with the values for vital capacity obtained by the Sanborn spirometer. The chief reason why chest expansion forms so poor an index to vital capacity is because it neglects the diaphragmatic factor in the mechanism of respiration.

Vital capacity also has a positive correlation with body build, although the degree is even somewhat less than that between vital capacity and chest expansion. That is, stouter individuals tend to have a higher vital capacity, up to a certain point. As obesity is approached, however, the relationship is reversed, giving a negative correlation. This is probably because the accumulated masses of excess fat interfere with the respiratory mechanism, as was recognized long ago by John Hutchinson.

The systolic blood pressure in the present group shows a very slight positive correlation with the body build, so slight that it is of very doubtful significance. The results of this study therefore lend very little support to the doctrine that stouter individuals tend to have a higher

blood pressure, and slender individuals a lower blood pressure.

The pulse rate shows a low, but somewhat more definite, negative correlation with body build. That is to say, in the present group the stouter individuals tend to have a somewhat slower pulse rate. Possibly this may be on account of variations in thyroid function, but no basal metabolism tests were available. Another interesting result of the pulse rate tests was the indication of three distinct groups or types, with maximum frequencies around 71, 79 and 95. These are apparently not merely accidental variations in frequency distribution, but their significance is uncertain.

Schneider's cardiovascular test\* is comparatively new. It is supposed to be a measure of cardiovascular efficiency and resistance to fatigue, but its value is apparently still uncertain. From the present study, certain points of interest are evident. In the first place, the cardiovascular rating is extremely variable. Its coefficient of variability (41.47 per cent), as shown in table 1, is far greater than that for chest expansion (28.75), which in turn is much greater than that for pulse rate (15.11), vital capacity (14.54), or systolic blood pressure (9.88).

Schneider states that: "It is suggested that a score of nine or less gives reason for an overhaul of the patient by a clinician." If this is correct, it would mean that nearly half of the students at the University of Minnesota are in a bad physical condition, as nearly half of them have a rating of nine or less. Since the student body is actually a fairly healthy group, it is apparent that the limit of normality for Schneider's cardiovascular test must be considerably below nine.

Between body build and cardiovascular rating in the present series there is a rather low but significant positive correlation. That is, a stouter body build tends to accompany a higher cardiovascular rating.

The relations between body build and physiological functions as found in the present group may be summarized as follows. As to the respiratory mechanism, there appears no appreciable correlation between body build and chest expansion; but there is a definite, though rather small, correlation between body build and

\**Jour. Am. Med. Assn.*, 1920, 74, 1507.

vital capacity. As to cardiovascular functions, the present data indicate a slight negative correlation between body build and pulse rate, a doubtful correlation between body and systolic blood pressure and a rather small positive correlation between body build and Schneider's cardiovascular rating. On the whole, the comparatively low degrees of correlation found would seem to indicate that the respiratory and cardiovascular functions are dependent chiefly upon factors not directly associated with the general bodily habitus.

#### DIABETIC FOODS

A recent food inspection decision of the U. S. Department of Agriculture revokes the official definition of so-called diabetic foods, thus automatically placing such preparations in the class of drugs. The government holds that references to any disease condition in the labeling of such articles implies to the public that they are efficacious treatments, and it therefore asks manufacturers and distributors to omit any such references from their trade packages. An investigation showed that "diabetic foods" were being held out to sufferers from diabetes as treatments for their condition rather than as mere diabetic aids in the management of the disease. The action taken is a gratifying official support of the efforts of the Council on Pharmacy and Chemistry to convince manufacturers that therapeutic recommendations should not have a place on a trade package. However, the Council has taken a liberal attitude and does not object to the naming of diseases on trade packages of medicinal foods, or to a name implying the use of the product in diabetes, provided the advertising makes it clear that the product is not offered as a cure or even as a remedy for the disease. The greater stringency of the attitude of the government arises, no doubt, from the fact that it is acting on the basis of a law, the letter of which refers only to the trade package and label. (*Jour. A. M. A.*, June 11, 1927, p. 1895.)

#### THE ASSIMILATION OF IRON

Investigations have been published, which the investigators believe to indicate that vitamin E is a substance specifically related to iron assimilation in a manner comparable to the relation of vitamin D to phosphorus and calcium metabolism. On this basis the use of ferric citrate and a fat having the properties of wheat germ oil—a potent source of vitamin E—is suggested as a logical basis for the treatment of secondary anemias. Since liver is rich in iron and in vitamin E this may be an explanation for the reported value of liver in the treatment of pernicious anemia. (*Jour. A. M. A.* April 23, 1927, p. 1323.)

#### THE VALUE OF BRONCHOSCOPY IN DIAGNOSIS AND TREATMENT OF PULMONARY DISEASE\*

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Bronchoscopy has developed in recent years from a procedure used almost exclusively for the removal of foreign bodies in the air passages to one of the most valuable aids in the diagnosis of obscure pulmonary disease. Its introduction into the field of pulmonary diagnosis was not accomplished without considerable difficulty and opposition. Until recently it was regarded as a procedure to be avoided and discouraged, and without value. Through the untiring efforts of the earlier bronchoscopists this opposition was gradually overcome, so that within the comparatively short period of six years the attitude of the medical profession toward bronchoscopy has undergone a marked change. The interest of the medical profession in bronchoscopy is further manifested by the increasing number of physicians attending the bronchoscopic clinics as well as their increasing knowledge of the procedure and the problems involved. It is surprising how the attitude of the patient has likewise changed. A few years ago it required considerable eloquence to secure a patient's consent to bronchoscopy, whereas within the last few years this has not been so necessary. Patients have come to us complaining that their condition had not received proper consideration because bronchoscopy had not been performed.

Rather than enter into a theoretic discussion of the value of bronchoscopy in the diagnosis and treatment of pulmonary disease I shall discuss the experience at the Mayo Clinic during the last year. During this period 165 patients were examined with the bronchoscope, some of them more than once. All such examinations were performed by Vinson or myself. Bronchoscopy was performed only after a thorough examination from the medical standpoint by all the ordinary methods available and only when it

\*From the Division of Medicine, Mayo Clinic, Rochester, Minnesota. Read before the Lymanhurst Hospital Staff, Minneapolis, Minnesota, June 28, 1927.

might give some added or necessary information.

It is not necessary to call attention to the value of bronchoscopy in the localization and removal of foreign bodies known to be in the air passages. It is a good rule to remember that the sooner they are removed after inhalation, the easier the task. However, it is rare for a

ways give the same striking results as the removal of inhaled foreign bodies, although it is often of considerable benefit. Calcareous deposits sometimes occur along with foreign bodies, and must be removed to obtain the maximal result. The deposits themselves seldom cast a shadow in the roentgenogram. In one

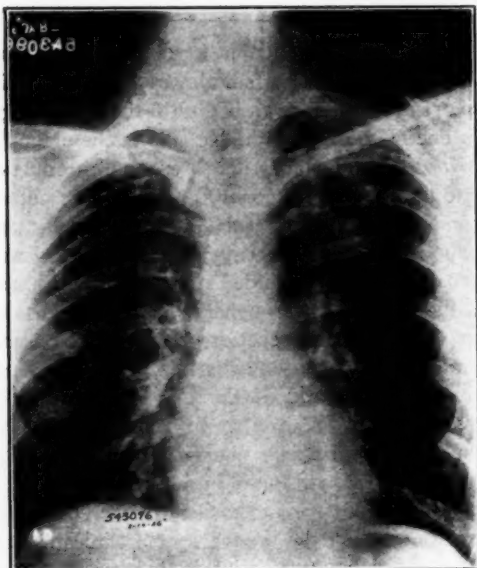


Fig. 1. Abscess of left upper lobe before bronchoscopy.

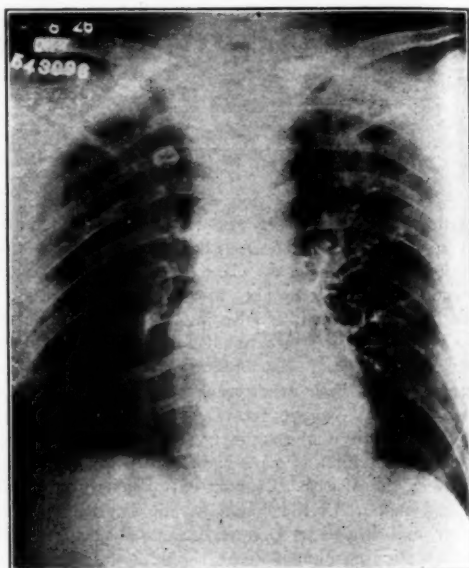


Fig. 2. Same case as in Figure 1, three weeks after aspiration.

foreign body to constitute such an emergency that it should not be carefully studied before removal is attempted. The possibility of foreign body should be kept in mind in all cases of pulmonary suppuration or infiltration of indeterminate origin. It is also well to remember that a roentgenogram negative for foreign body does not necessarily rule out its presence. While this is a rather uncommon finding, when it is encountered the results obtained are so striking that it always deserves consideration. Bronchiectasis or pulmonary abscess of apparently severe nature due to a foreign body generally disappears as if by magic with removal of the foreign body. During the last year several such cases have come under our observation (Fig. 1).

It is important to differentiate calcareous deposits, frequently found in cases of old pulmonary suppuration, from inhaled foreign bodies. The removal of calcareous deposits does not al-

ways give the same striking results as the removal of inhaled foreign bodies, although it is often of considerable benefit. Calcareous deposits sometimes occur along with foreign bodies, and must be removed to obtain the maximal result. The deposits themselves seldom cast a shadow in the roentgenogram. In one

case the inhalation of a toothpick had resulted in pulmonary abscess which did not disappear with removal of the foreign body; on bronchoscopy many calcareous deposits were removed and all pulmonary symptoms completely disappeared (Fig. 2). While the diagnosis of bronchiectasis may be relatively simple, at times it may be extremely difficult. Hemoptysis without definite indications of tuberculosis should always make one suspect bronchiectasis. Vinson recently learned that hemoptysis was present in 49 per cent of the cases of bronchiectasis as compared to 29 per cent of tuberculosis and 18 per cent of mitral stenosis, in a series of 300 cases. Bronchoscopy is indicated in bronchiectasis when doubt exists as to a positive diagnosis, especially when there is a history of hemoptysis, as a long course of treatment in a tuberculosis sanatorium may be thus avoided. In cases of hemoptysis it is often



of paramount importance to know definitely which lung is involved and where the bleeding originates, as occasionally bronchiectasis may result in such severe hemorrhage that artificial collapse of the lung must be considered. Vinson and I do not hesitate to use the bronchoscope during a period of hemorrhage when this infor-

ribbon of blood will lead down the bronchus to the involved area.

When any doubt exists as to the etiology of the bronchiectasis, bronchoscopy should be performed, as occasionally a foreign body or strictures causing insufficient drainage may be located. Simple drainage and aspiration in such

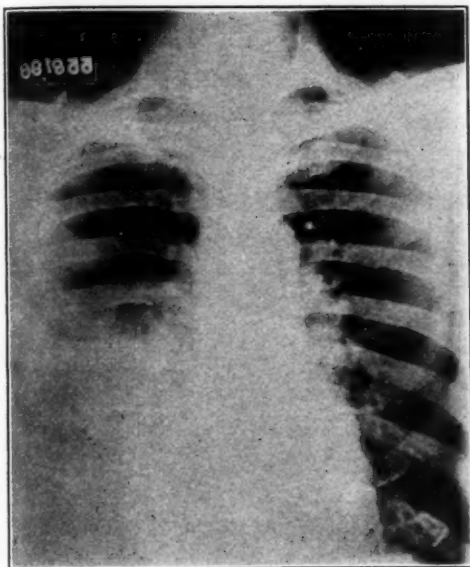


Fig. 3. Pulmonary abscess on admission of patient.

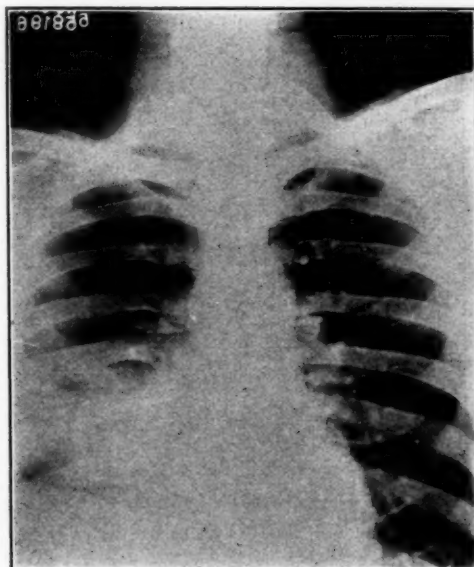


Fig. 4. Same case as in Figure 3, one week after bronchoscopic drainage.

mation is necessary, as we have never noted ill effects.

The localization of bronchiectasis is also frequently highly important, if surgical and other therapeutic measures are to be instituted. Unfortunately its localization is notoriously unreliable by the ordinary diagnostic measures. Even the roentgen ray is not always reliable. During the last year sixty-six patients with bronchiectasis were examined bronchoscopically at the Clinic and the condition found to be bilateral in many instances after it had been reported unilateral on roentgenologic examination. It was also found on the side opposite to that reported on roentgen-ray examination. If the condition is bilateral, surgery is necessarily contraindicated. Bronchoscopically, the diagnosis of bronchiectasis is made from the presence of pus, the dilatation of the bronchus, the decreased elasticity of the bronchial wall, and the congestion of the bronchial mucous membrane. At times a narrow

cases may prove of considerable value, but unfortunately in the majority of instances these procedures must be constantly repeated to prevent the return of symptoms.

We have had several patients with bronchiectasis and an associated debilitating disease who developed dyspnea and cyanosis from the accumulation of the thick tenacious secretion and were too weak to expectorate and were practically drowning in their own pus (Fig. 3). Rapid improvement followed the aspiration of the pus and the increased aëration of the lung.

Pulmonary abscess has always been one of the most difficult pulmonary diseases to diagnose and treat. It has been estimated that 50 per cent of untreated cases of pulmonary abscess terminate fatally. It is fortunate, therefore, that it is in this condition that bronchoscopy has been most effective. At first bronchoscopy was employed in these cases simply as a possible aid in the localization of the abscess preparatory to

surgery. It was a great satisfaction to note in some cases marked improvement in symptoms with an accompanying change in the roentgenogram. We soon were able to send several patients home completely cured, simply through bronchoscopic drainage. At first it was thought that such results would only be obtained when

cavity through normal lung tissue. Cases of pneumonitis, of course, will not show the same remarkable results as cases of abscess.

In cases of unexplained pyrexia and increased leukocytosis it is well to keep in mind the possibility of a small lung abscess or bronchiectasis with plugging. Recently I examined two such

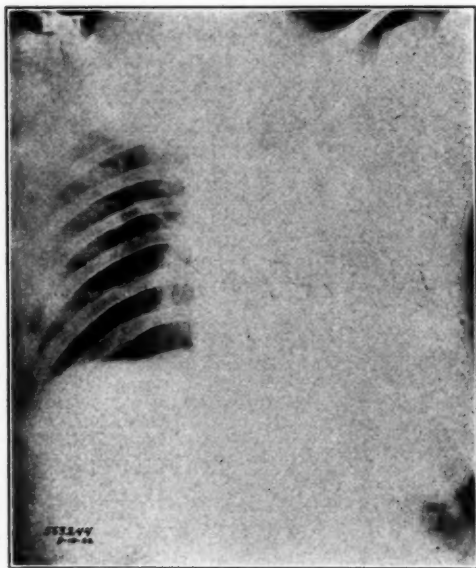


Fig. 5. Massive collapse of lung before aspiration.

the abscess was extended about the hilus. To our surprise this was soon disproved, as we have since obtained some of our most striking results in cases in which the abscess was situated near the periphery. It was further believed that benefit could be hoped for only in cases of abscess of short duration, but this again has been disproved in our experience, although as a rule the shorter the duration of the abscess, the better the result from bronchoscopic drainage. Figure 4 shows the result of bronchoscopy in the case of an abscess of the upper lobe a week after the first treatment with disappearance of all symptoms. At the time of bronchoscopy the patient had temperature of  $102^{\circ}$  and a leukocyte count of 20,000. Figure 5 shows the result obtained in a case of abscess of the lobe one week after bronchoscopy. Last year ten such cases were treated, eight of which were definitely benefited. I believe that with more study we shall find that it will be possible to penetrate into the abscess

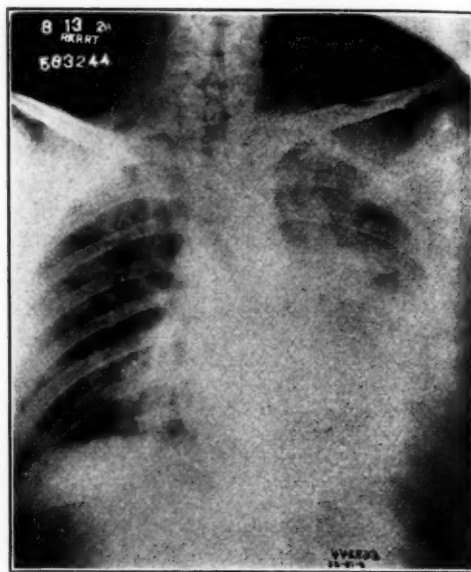


Fig. 6. Same case as in Figure 5, ten minutes after bronchoscopic drainage.

patients with the bronchoscope; both had a slight non-productive cough with a negative physical and roentgen-ray examination. In the first case an abscess was found in the left lower lobe behind the heart with a stenotic bronchus. About 3 or 4 ounces of pus was obtained and all symptoms disappeared (Fig. 6). In the second case an area of bronchiectasis was located as shown by roentgen ray; there was also a stenotic bronchus causing insufficient drainage. Pus was aspirated and the stricture dilated with relief of symptoms.

In our opinion one of the most reasonable indications for bronchoscopy in practically all pulmonary diseases of unknown origin in preference to indirect methods is the ability to see minute lesions and tumors. The roentgenograms in the majority of these cases are generally negative. There is no other method that I know about at the present time that will enable one to detect these lesions. Two such cases have come

under our observation recently, one of granuloma of the bronchus and one of fibroma. Extensive treatment for every conceivable condition has been given in both cases.

A condition which is included under this group and which is proving of the greatest interest at present is that of carcinoma of the lung. During the last year we found eighteen such cases and made microscopic diagnosis of carcinoma in eleven and of lymphosarcoma in one. In some of these cases the roentgenogram along with the clinical history made us suspect such a condition. However, in many the roentgen ray was indeterminate and in one case negative. It is obvious that, without the assistance of bronchoscopy, the diagnosis in most instances would have been missed. As carcinoma of the lungs is still under investigation I am deferring a more comprehensive review of this subject until later. However, suffice it to say that a history of hemoptysis with sudden loss in weight should suggest pulmonary carcinoma.

Bronchoscopy is of great value in massive collapse of the lung. It was used in one such case during the last year. The patient had all the characteristics of massive collapse. During the night he became very cyanotic and dyspneic and appeared to be dying. About a pint of fluid was aspirated from the lung with the bronchoscope. During the procedure the heart returned to its normal position and the patient began to breathe

easier. He then recovered rapidly and all his symptoms completely subsided.

A negative bronchoscopic examination of the bronchus may also be of considerable importance from a psychologic viewpoint. Furthermore, a negative examination may cause a more intensive examination elsewhere with the possible localization of the trouble outside the respiratory system. I have secured considerable benefit in an occasional case of bronchitis from the simple passage of a bronchoscope. About a year ago I used the bronchoscope for a man who had a chronic cough with expectoration of blood of six months' duration. Bronchoscopy revealed only congestion and inflammation of the mucous membrane. However, within a week all the symptoms had disappeared, and within a year he had regained the sixty pounds he had lost the six months previously.

#### SUMMARY

Experience teaches that bronchoscopy is desirable in the diagnosis and treatment of all pulmonary lesions of an indeterminate nature. It seems advisable to use the bronchoscope only after a complete clinical examination and before any foreign substance is introduced into the lung, as direct examination is of the greatest possible value, not only in disclosing the actual conditions at first hand but also and especially in discovering bronchial tumors and plugged bronchi which cannot possibly be as well portrayed by means of shadows.

#### LENS ANTIGEN

In 1924 the H. K. Mulford Company requested consideration of "Lens Extract," by the Council on Pharmacy and Chemistry, presenting as evidence for the value of the preparation the reports by A. E. Davis. The Mulford Company was informed that the evidence which it had submitted had been considered by the Council; that the referee to whom the product was assigned had consulted with a number of ophthalmologists, all of whom had agreed that the evidence for its usefulness was not acceptable, and that the Council had postponed the consideration of Lens Extract until more evidence becomes available to demonstrate its therapeutic value. Since then Dr. Davis has published two further articles. The Mulford Company has, however, not requested further consideration of its "Lens Extract," and the Council has taken no further action regarding it. (Jour. A. M. A., May 28, 1927, p. 1749.)

#### PREVENTION OF SCARLET FEVER

The ideal procedure in the case of a child exposed to scarlet fever is to make a skin test to determine whether the child is susceptible or immune to scarlet fever and at the same time make nose and throat cultures to learn whether the child is infected with hemolytic streptococci. If the skin test is entirely negative, further preventive measures are not indicated unless the cultures show the presence of hemolytic streptococci, in which case the child should be kept away from other susceptible children. In case the skin test is positive, the next step depends on the results of the nose and throat cultures. If these are negative and further exposure can be avoided, active immunization with toxin should be begun at once. If the skin test and the nose and throat cultures are positive, the administration of a prophylactic dose of scarlet fever antitoxin is justified. (Jour. A. M. A., May 14, 1927, p. 1587.)

## ACUTE SUPPURATIVE APPENDICITIS: FACTORS IN MORTALITY\*

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It would seem that a most humble apology is in order for bringing this subject to the attention of the profession. The profession and laity alike seem to have been lulled by the optimistic reports from various sources into the belief that appendicitis does not amount to much any more. We feel that the subject is not beneath our notice.

Our attention was drawn to the subject by the knowledge that in Minneapolis, a city of 425,000 people with a total of 4,932 deaths, appendicitis during 1925 contributed to the death of 89 persons, a death rate of 20 per 100,000. The number is not large, it is true, but nevertheless nearly 2 per cent of the deaths in Minneapolis are due directly or indirectly to appendicitis.

About a year ago Willis<sup>1</sup> called attention to the mortality from surgical conditions as recorded in the census office. He found that the mortality from hernia had dropped off 18 per cent from 1901 to 1905; that kidney surgery mortality had decreased 11 per cent during the period from 1905 to 1921; and pelvic surgery mortality had decreased 26 per cent during the same period. Gallbladder surgery increased in mortality from 1901 to 1922 some 72 per cent, appendicitis 31 per cent, and thyroid surgery mortality increased 250 per cent in the same period of time. On the basis of the 1922 mortality there are some 16,000 deaths from appendicitis each year in the United States. Surely a subject concerning the lives of some 16,000 people each year should hold our interest, and, though reduced to 89 for our own community each year, it is still worthy of our serious thought and consideration.

The mortality statistics with individual surgeons vary within certain limits, and are influenced not only by various personal factors, but by the class of patients treated, hospital facilities, and other local factors. No matter what figures are chosen for discussion there is room for improvement.

It seems that appendicitis is a disease of civilization, and as long as we are civilized we must expect to have the disease prevalent. Its incidence is remarkably low in the older parts of the world, and practically no cases are encountered among the hill tribes of India (McCarri-son, in nine years' practice). Sex seems to play but little part in the incidence, yet most surgeons encounter the disease more often among males. The figures for prevalence according to age vary with the experience of the surgeon, yet no age group is immune to attacks of appendicitis. It is most common among the young adults and the middle aged group. Some authors have tried to show a family tendency, yet it would seem that the diet of the family should be considered as well as the family history. Trauma plays a definite rôle in the initiation of the disease. The trauma may be from within as well as from without. Small sharp articles may injure the mucosa and allow the entrance of bacteria in sufficient quantities to start an acute inflammatory process. The influence of fecoliths cannot be overlooked. Most concretions consist of about 50 per cent by weight of coprosterol and cholesterol, 25 per cent inorganic salts (calcium phosphate), and about 20 per cent cellulose. Appendicitis may be secondary to adjacent disease. Intestinal parasites may enter the appendix and help to cause an attack. Diet seems to be an important factor in explaining the incidence among Roumanian city dwellers of 1 in 221 cases as compared to the peasant rate of 1 in 22,000 cases. The diet of the peasant consists of vegetables chiefly, while the city people are large meat eaters. Likewise among the vegetarian tribes in Arabia, India and Japan, very few appendicitis cases are encountered. Short,<sup>2</sup> of England, has been the chief exponent of the cellulose idea in relation to appendicitis. He calls attention to the geographical distribution of the disease and to the fact that the appearance of appendicitis in England coincided with the large importation of highly protein foods. The incidence is low in institutions where the diet is coarse and appendicitis appears among the animals in captivity deprived of cellulose-containing food. Experimentally, Short showed that the cellulose mechanically acted to prevent the development of inflammations about the appendix. Bacteria encountered in the appendix are named in the order of prevalence: colon bacilli,

\*Read before the Minneapolis Surgical Society, April 7, 1927.



staphylococci, streptococci, pneumococci, tubercle bacilli, actinomycosis.

#### ANATOMY

Paul Reclus states: "The veriform appendix is the diverticulum of a diverticulum; the cecum of a cecum." It is the undeveloped part of the cecum corresponding to the long terminal portion of the latter found in the lower animals. Its size and position are variable. The average length is 3.9 inches. It has its own mesentery, which when too short will cause a curling of the appendix on itself. The lumen opens about one inch below the ileo-cecal valve. The appendicular artery, a branch of the posterior ileocecal, runs behind the ileocecal angle, across the ileum and reaches the appendix by way of the mesentery, giving off branches up to the tip. The veins accompany the arteries. It is thus seen that the blood supply is rather precarious and is readily liable to interruption. The lymphatics accompanying the blood vessels empty into the rather constant lymph node at the ileocecal angle. The appendix has an abundant nerve supply from the superior mesenteric plexus and the sympathetic system. Histologically, the appendix is made of a serous covering, continuous with the peritoneum; the muscular layer of longitudinal and circular fibers which enter a network at the base; a variable layer of submucosa; and the mucosa, which contains the lymphoid tissue, glands, etc. There is no lymphoid tissue at birth, but at 32 weeks the appendix has the appearance of an actively functioning gland. A gradual disappearance of lymphoid tissue is noted about middle life. In this respect it somewhat resembles tonsillar tissue. The appendix is most often located under McBurney's or Munro's point in the right lower abdominal quadrant. There are two locations near the appendix that have a relation to its disease. These are the ileocecal or ileoappendicular and the subcecal fossa.

#### PHYSIOLOGY

Little can be said concerning the physiology of the appendix. Dried extracts<sup>3</sup> are capable of initiating an evacuation of the colon without gripping. The appendix secretes an acid mucus and is capable of peristalsis.

#### PATHOLOGY

The pathology of the appendix has been worked out largely by the American profession. Outstanding names are those of Parker (1867), Fitz (1886), Bull (1873), McBurney (1889), Murphy (1889), Deaver, etc. Early names for appendicitis were typhlitis and perityphlitis.

In acute inflammation there are several stages:

1. Acute catarrhal. In this condition the mucosa alone is involved.

2. Diffuse. Because of the natural tendency to penetration, the catarrhal process often extends to the submucosa, gives rise to petechial hemorrhages and the process often extends to the serosa. Resolution may take place at any time if the process is arrested. The process, however, often extends and the appendix then becomes enlarged, thickened, elongated, dark or bright red in color, with a purulent exudate on the surface. An abscess may develop at the site of the petechial hemorrhage. The mucosa, swollen and congested, may erode even to penetration of the peritoneal covering. Should a perforation occur an abscess forms. Adhesions usually form and localize the abscess.

3. Gangrene. This is but the further development of the acute diffuse variety, putrefaction being a result of interruption of the blood supply. Other factors in the production of gangrene are: (a) ischemia due to pressure of pus under the relatively inelastic wall of the appendix; (b) increased virulence of the organisms causing development of violent inflammation; (c) the liberation and absorption of toxins under tension, causing pressure and toxic necrosis of the surrounding tissue.

In streptococcal inflammations there is often rapid extension of the process from mucosa to peritoneum and a general peritonitis may be present without much apparent inflammation of the appendix. The symptoms due to the appendix may thus be masked by those of the supervening peritonitis.

In the severe infections the mesoappendix and the mesenteric fat are often involved. Perforation of the appendix may occur at any time, may be pin-point in size or large, may occur as a result of pressure necrosis or erosion from ulceration of the mucosa.

Wilkie<sup>4</sup> described two acute processes in the appendix: the acute inflammation with rise of

pulse and temperature from the onset; and the acute obstruction with vomiting, colic and tenderness but without fever or tachycardia at the onset. He believed the nature of the fecal material in the appendix influenced the clinical picture in acute obstruction. High protein feces produced rapid gangrene while high cellulose feces produced less rapid changes.

Irwin<sup>5</sup> found, as causes of acute obstruction, concretions in fifty and strictures in six out of eighty-seven cases.

#### SYMPTOMS

The classical symptoms are so well known that they need little description. It should be emphasized that the large majority of cases present these symptoms in a certain sequence; and also that an occasional case will develop atypically. The symptoms according to Murphy are:

1. Pain, sudden, severe, colicky, often located first in the epigastrium, becoming most intense within four hours. The sudden cessation of pain means release of tension (ruptured appendix). Redwitz<sup>6</sup> considers pain a result of endarteritis present.
2. Nausea or vomiting, a reflex from the distention of the appendix. Secondary nausea and persistent vomiting are due to peri-appendicular involvement with peritoneal irritation.
3. Sensitiveness—at first diffuse, later localized over the appendix. Sudden increase after localization, associated with secondary nausea and persistent vomiting, indicates an involvement of the peritoneum.
4. Fever develops in from two to twenty-four hours, and remissions and exacerbations indicate infected areas, and call for immediate operation.
5. Leucocytosis. Moderate increases are noted; leucopenia is never found. The percentage of polymorphonuclears indicate the severity of the infection but not the extent of involvement. A sudden fall in leucocyte count is a bad prognostic sign.

Symptoms appearing out of this order should cause one to question the diagnosis and to investigate carefully. One should be very careful in examining the abdomen after the process has been present more than twenty-four hours, be-

cause the delicate adhesions are easily broken and allow spreading of the infection.

#### DIFFERENTIAL DIAGNOSIS

Pelvic trouble may simulate appendicitis, such as salpingitis, pyosalpinx, ruptured tubal pregnancy, twisted pedicle of a small ovarian cyst. The history and a careful bimanual examination will establish the cause of the illness, though here it should be noted that appendicitis and pelvic diseases are often associated.

Renal causes such as Dietl's crisis from movable kidney, renal or ureteral calculus, may confuse one. The character and location of the pain, the absence of fever, an examination of the urine, and the x-ray will clarify the picture.

Hepatic causes such as cholecystitis or lithiasis should be mentioned. The position of the tenderness, history or presence of jaundice and the radiation of the pain should aid in the diagnosis. In consideration of this point one should remember the sub-hepatic appendix and the low gallbladder—the one may be mistaken for the other.

Gastric and duodenal causes may be excluded by a history of pain in relation to food intake, the association of epigastric tenderness, hematemesis, bloody stools, and gastric dilatation.

Pulmonary disease, as pneumonia or pleurisy, may mimic the pain of appendicitis. Always carefully examine the chest. A very high leucocyte count (25,000) in the first twenty-four hours of illness is more indicative of pneumonia than appendicitis. A history of a chill will often be elicited in pneumonia. Dilatation of the aë nasi will indicate pneumonia, and tenderness in the right side upon rectal examination will favor diagnosis of appendicitis.

#### MINNEAPOLIS EXPERIENCE

The deaths in the city of Minneapolis have been subjected to an analysis made possible by the whole-hearted co-operation of the Department of Health.

Deaths from:	1925	1926
Acute suppurative appendicitis....	57	53
Acute appendicitis.....	16	20
Chronic appendicitis.....	16	19
Cases operated.....	85	85
Cases not operated.....	4	7

It will be seen that no age group is immune to acute appendicitis. One case is recorded of acute perforating appendicitis with abscess for-

mation in a child twenty-six days old, the whole process apparently occurring in twenty-four hours. Not all deaths from appendicitis are due to acute infections; from 15 to 20 per cent of the deaths attributed to appendicitis occur in chronic cases.

#### *Acute Suppurative and Acute Appendicitis Cases:*

##### *Age Groups Affected*

—9	11	7
10—19	12	11
20—29	19	11
30—39	10	12
40—49	9	12
50—59	9	9
60—69	1	7
70—79	2	4
80—89	1	—
<i>Average Ages</i>	30.3	34.7

##### COMPLICATIONS IN ALL CASES

	1925	1926
Surgical shock.....	4	1
Embolism—pulmonary, cerebral, mesenteric .....	6	10
Empyema, respiratory paralysis.....	2	—
Peritonitis, general or local.....	47	44
Ileus .....	15	19
Septicemia, pyemia.....	6	7
Pneumonia, bronchial, lobar.....	11	6
Kidney complications.....	1	2
Heart complications.....	6	6
Dilatation of stomach.....	4	1
Secondary abscess.....	3	1
Gangrene of ileum.....	1	1

Other complications mentioned in the records were: pancreatitis, encephalitis lethargica, Meckel's diverticulum, diabetes mellitus, and fecal fistula. There were records of forty-four cases of acute disease in which the duration of the illness was more than the days in attendance by the attending physician. The average duration of these forty-four cases without medical attention was 3.1 days. This would tend to indicate that in 60 per cent of the fatal acute cases there was a delay in calling medical attention. The duration of the disease was less than the days in attendance in twelve records, with an average of over four days under observation by the attending physician prior to development of the acute attack. This would indicate that in a

certain percentage the error falls to the side of the physician in that he did not make an early diagnosis, or could not convince the patient, or for one reason or another failed to reach the site of trouble early.

##### HOSPITAL EXPERIENCE

An effort was made to get an idea of the experience of the local hospitals relative to the prevalence and mortality of acute appendicitis by questionnaire methods. Not all the local hospitals answered the queries. The information we obtained follows:

Total and acute and chronic appendicitis cases operated .....	1,656	
Total hospital deaths from acute and chronic cases....	38	(2.3%)
Total acute suppurative appendicitis cases operated	375	
Total hospital deaths from acute suppurative cases....	23	(6.1%)
Total cases appendicitis operated .....	1,851	
Acute suppurative cases operated .....	475	(about 25%)

It will be seen from this report that only 47 per cent of the deaths from appendicitis in Minneapolis are accounted for in the replies received. The other 53 per cent of the fatal cases must be divided among the institutions not replying. The reasons for the lack of the response we do not know. We have seen from our replies that the experience of the hospitals relative to the proportion of acute suppurative cases to the total cases varies widely. Some hospitals seem to have many, others mostly chronic and simple acute cases. But with some 47 per cent of the deaths accounted for, it would seem that about one in every four cases of appendicitis operated is because of an acute suppurative type of inflammation. Acute suppurative appendicitis is a serious disease and requires skillful surgical care and judgment. When so prevalent, it deserves our serious consideration, and should be regarded as major surgery.

##### PERSONAL EXPERIENCE

We have taken this opportunity to report a series of 130 cases in which the diagnosis of acute suppurative appendicitis was confirmed at

operation. The cases of acute catarrhal, and acute diffuse inflammation were excluded. This presentation is a chronological series of cases over a period of years in the practice of one of us (I. S.). No patient was denied an operation, however hopeless the prognosis seemed before operation. Only one patient refused operation. This case was not included in the series, although autopsy confirmed the diagnosis. Among the 130 operated cases there were twelve fatalities, giving a mortality of about 9 per cent for the whole series.

Series A—50 cases, 6 deaths, 12% mortality

Series B—80 cases, 6 deaths, 7.5% mortality

This division of the series corresponds to changes in operative technic, including abandonment of rubber tubing for drainage. Kahn,<sup>7</sup> in 1921, reported 195 similar cases with a mortality of about 5 per cent, and other authors have reported mortality figures more or less than those already given. It is when the inflammation gets beyond the appendix that high mortality figures are found.

The ages given on 126 records show a distribution as follows:

Age	No. Cases	Deaths	Mortality %
—9	11	1	9
10—19	25	3	12
20—29	34	2	6
30—39	23	3	13
40—49	22	1	4
50—59	5	0	—
60—69	3	0	—
70—79	2	1	50
80—89	1	1	100

The duration of the illness on the day of admission was as follows:

Duration (Days)	No. Cases	Deaths	Mortality %
1	14	0	0
2	38	5	13
3	16	3	19
4	15	3	20
5 to 10	15	0	—
10 days or over	11	1	9

The administration of large doses of cathartics is recorded in three of our fatal cases prior to admission. Early records with incomplete data prohibit drawing any conclusions.

The findings at operation were recorded as follows:

Localized peritonitis 111 cases, 2 deaths, mortality 1.7%.

Generalized peritonitis 19 cases, 10 deaths, mortality 52%.

The deaths in the cases with localized peritonitis were due to complications. In one, hypostatic pneumonia developed in an old lady of 87 following a secondary operation for resuturing of the wound; and in the other an ileus developed ten days after the primary operation. It is considered that without surgical intervention all of the nineteen cases with general peritonitis would have proved fatal. The presence of a general peritonitis at operation carries with it a definitely high mortality rate, and is a large factor in the mortality from appendicitis.

Abscess formation was recorded as present in 91 cases, with 12 deaths, a mortality of 13 per cent. It was absent in 39 instances, with no mortality. In the thirty-nine cases there was no definite abscess outside of the appendix, but all the appendices contained purulent material. It will be seen that the presence of an abscess is a decided factor in mortality.

Macroscopic perforation was noted in 75 cases, with 10 deaths, a mortality of 13 per cent. It was absent in 55 cases, with 2 deaths, a 3 per cent mortality. The two deaths were attributed to complications: one of hypostatic pneumonia after secondary operation for resuturing; the other of exacerbation of tuberculosis about twenty days after operation. Here again it will be noted that the presence of perforation is a decided factor in mortality figures for the same reason as with abscess formation. The increased number of abscess cases over perforation cases may be explained by the formation of an abscess due to small pin point perforations that escape the attention at operation. Perforated suppurative appendicitis is generally recognized as associated with a mortality ranging from 20 to 50 per cent.

Ileus was noted in 52 cases, with 7 deaths, a mortality of 13 per cent. It was absent in 78 cases, with 5 deaths, a 6 per cent mortality. Ileus may be mechanical or paralytic. In this series all the cases of ileus were those of the mechanical variety. The average duration of the illness in the fatal cases with ileus prior to admission was four days. It will be seen that ileus



at operation carries with it additional mortality figures and the delay between onset and admission is considered to have an important relation to the serious nature of the condition seen at operation. Three of the seven fatal cases with ileus were almost moribund at operation, one had an additional gangrene of the bowel, and one was a chiropractor who delayed operation until ileus was very well established.

Gangrene was noted in 52 cases, with 10 deaths, a mortality of 13 per cent. Gangrene was absent in 78 instances, with 2 deaths, a 3.4 per cent mortality. One of the two deaths was due to an exacerbation of an old tuberculous infection; the other to a post-operative bronchopneumonia. That ten of the fatal cases had a well developed gangrene present indicates that this is an important factor in mortality.

But one of the twelve fatal cases had a fecolith recorded. The presence of a fecolith per se is not a factor in mortality.

The appendix was found to be retrocecal in 81 cases, among which were 5 deaths, with a mortality of 6.1 per cent; the appendix was in the pelvis in four cases, not one of which was fatal; the appendix was found in a hernial sac in one case which recovered; and was found to be more or less in normal locations in the remaining 44 cases, among which were 7 fatal cases. In this series the location of the appendix did not materially affect mortality figures.

The appendix was removed in all but 7 cases, in one of which the appendix had sloughed off. One was not removed, because of severe hemorrhage encountered from behind the cecum, and another was allowed to remain because of the poor condition of the patient on the table. Eleven of the fatal cases had the appendix removed at primary operation, one fatal case had not, which leaves the mortality figures about on a par. We believe in the removal of an infected appendix at primary operation if at all possible.

Ether was poured into the abdominal cavity in 70 cases, among which occurred 9 deaths. Ether was not used in the remaining 60 cases because the operation was performed prior to formation of an abscess, or for other reasons. We are not positive about the rôle of ether in presence of purulent exudate, but we believe that ether is an antiseptic and can safely be used in rather large quantities. We believe that ether closes the lymphatic channels in raw surfaces and prevents

the rapid absorption of toxins. It forms a coagulum over the surfaces of the bowel, which causes the bowels to temporarily adhere, later absorbs and leaves the bowel surfaces free and in a natural condition. Ether also acts as a cardiac and respiratory stimulant.

#### OPERATIVE TREATMENT

The usual treatment is immediate surgery. We have not been converted to the Ochsner method, though there can be no question but that it is of considerable value in selected cases, especially in the absence of experience in the handling of severe surgical infections. We do not believe that the operation per se in the hands of an experienced surgeon increases the mortality rate of the disease. We further believe that all appendices, with but very few exceptions, should be removed at the primary operation. We endeavor to operate as soon as possible after the diagnosis is made.

The patient is prepared as for the usual laparotomy except that no enema is given until just before the operation. The usual hypodermic injection of morphine and atropine is given. The patient is shaved and not scrubbed on the table. Iodine and alcohol are used for skin disinfection.

The incision is a modified right rectus, more or less transverse, beginning at the outer border of the right rectus at about the level of the anterior superior spine of the ileum, cutting through the skin and superficial fascia and outer sheath of the rectus. This incision can be lengthened in either direction in a straight line for more room as the occasion may require, without affecting the strength of the abdominal wall. The rectus muscle is retracted inward and the inner sheath and peritoneum is opened in more or less of a straight line because when the wound is sutured the rectus covers the internal suture line, and the outer suture line does not lie over the inner suture line to any extent, consequently one factor favoring post-operative hernia is diminished. We believe that because of this incision our post-operative hernia incidence is low, even though drainage is free and prolonged.

After the peritoneum has been incised and the edges of the wound retracted, search is gently made for the appendix. When the appendix is found, moist gauze packs are used to wall off any abscess that may be present. If an abscess

is found, moist gauze sponges are used to cleanse the cavity. At times a suction pump may be used. By gentle manipulation the appendix is freed, even though it is retrocecal or retroperitoneal, and brought into the wound. The mesentery is clamped and ligated, often in sections. The appendix is removed by doubly ligating the base, excising and cauterizing the stump with phenol and neutralizing with alcohol. The stump is now dropped back into the abdominal cavity. We do not feel that the operation is complete until adherent loops of the ileum are searched for, and if pus is present in the pelvis it is more than likely that a loop of the ileum will be found adherent to the bladder, uterus, rectum or pelvic wall. When such an adherent loop is found it is always freed and brought into the general abdominal cavity. If pus is present in the pelvis it is gently mopped out or removed by suction. We have no hesitancy in handling the bowel even though pus be present and we liberate the loops that are found adherent. But we do urge with emphasis the necessity of gentle handling of tissues. We frequently advise our associates regarding the absolute necessity of handling abdominal contents as gently as one would the tissues of the eye. It is possible to gently touch the cornea without injury, and the same holds true for the abdominal contents, but one cannot poke or pull on the tissues of either without causing damage. The rough handling of any and all tissues produces injury with erosion of the superficial layers, permitting the absorption of toxins and the formation of adhesions. We rarely use any instruments such as sponge holders, clamps, etc., on tissue not intended to be removed.

In cases where pus has been found and removed we are convinced that the use of ether poured into the abdominal cavity is of decided value, in amounts ranging from one-half to six ounces. We believe ether to be a definite antiseptic; that it produces a coagulum on the peritoneal and raw surfaces, and closes the lymphatic channels and thus prevents absorption of toxins, and that this coagulum will later be absorbed leaving the surface clean and free. Further, ether is a cardiac and respiratory stimulant. The toxicity of ether is negligible, especially as drainage is used in all ether cases.

Following the use of ether in all pus cases, Penrose cigarette drains are placed at one or

several locations, such as behind the stump of the appendix, in the right iliac fossa, and in the pelvis. The drains are led out at the lower angle of the wound. We do not use stab wound drainage. With this procedure we have found no infection of the wounds after operation.

The peritoneum and fascia are sutured with No. 2 catgut, the skin with No. 1, and 2 or 3 silkworm gut sutures are placed in the skin and fascia and tied across small pieces of rubber tubing to avoid cutting into the skin.

The post-operative treatment is rather simple. We believe in the free use of fluids. In the absence of vomiting, water is permitted by mouth soon after operation. Hypodermoclysis is used frequently as soon as the patient returns from the operation. We are not stingy with morphine. It is used as may be required for pain. Fowler's position in bed is always used where pus has been found. Lavage is utilized when vomiting has continued for twenty-four hours. Foods, except liquids, are restricted for at least forty-eight hours after operation. The above routine may be varied in individual cases to suit the occasion.

We feel that considerable progress has been made in pus cases when the appendix has been removed. The removal of the appendix does not increase the mortality, even if considerable manipulation is necessary for the removal, when done by a surgeon experienced in handling such conditions. In the case of the occasional operator the mere drainage of the abscess is often the indicated operation. We have not found that our fatal cases were the result of the operation but occurred in spite of it. Our fatal cases were those with general peritonitis, or ileus, or patients who died as a result of complicating conditions of heart or lung, over which the surgeon had but little control.

#### POST-OPERATIVE COMPLICATIONS

Ileus after operation was recorded in 9 patients, 8 of whom died. Ileus was present at operation in these 8 fatal cases. We believe that drainage as well as general peritonitis is a factor in the development of post-operative ileus. One of the cases developed ileus thirty days after operation, was reoperated and recovered fully.

General peritonitis was present in nine of our patients after operation, eight of whom died.

These eight cases had a general peritonitis prior to operation, with the very grave prognosis of advanced cases. One of our cases developed a general peritonitis after operation and recovered. We believe in operative treatment of all general peritonitis cases. That general peritonitis was encountered at operation in 19 cases, only eight of which proved fatal, only confirms the opinion.

Six of our patients developed a secondary abscess, all of which were drained. All recovered but one who died from ileus. It is apparent that this complication is not serious if promptly recognized and treated.

Fecal fistula was encountered in but one case, and followed the use of three rubber tubes for drainage. This case healed spontaneously and recovered fully.

Post-operative hernia was noted on the records in 10 cases. One of these was intentional, because the appendiceal abscess from a perforated appendix was found in a scrotal hernia at primary operation. The appendix was removed, the abscess drained, and an uneventful recovery followed. Secondary operation was necessary for the cure of the hernia. Of the nine remaining cases that developed hernia, rubber tube drains were used in seven. In the two cases encountered after the use of cigarette drains, one was a case that required secondary operation for secondary abscess and prolonged drainage. It will be seen that rubber drainage is the greatest factor in the development of post-operative hernia.

Two of our fatal cases developed a bronchopneumonia, a serious complication.

#### FATAL CASES

1. (1915) B. P. N., aged 35, came from out of town, was ill for five or six days, and at operation general peritonitis and a perforated gangrenous appendix with abscess were found. The appendix was removed, ether was poured into the abdominal cavity and rubber tube drains inserted. After twenty-four days it was necessary to reoperate because of formation of a secondary abscess which resulted from the deficient drainage through the rubber tubes. Death was due to ileus.

2. (1918) Miss B. F., aged 15, was first seen on the tenth day of the illness, came from out of the city, was operated on the eleventh day of her illness, when general tuberculous peritonitis, retrocecal abscess and tubercles on the ileum were found. The appendix was not removed because of the patient's poor condition

on the table, but the abscess was drained with rubber tubes. She lived for twenty days, but the late operation with the exacerbation of an old pulmonary tuberculosis prevented a recovery. Death was due as much to complicating tuberculosis as the appendiceal abscess.

3. (1919) Miss J. M., aged 4, was ill four days, came from out of the city, in an almost moribund condition, and was operated immediately. We found a gangrenous, perforated appendix with general peritonitis. The appendix was removed quickly, and rubber tubing drainage was instituted. She failed to rally and died the same day from general peritonitis. The operation was late, and the infection virulent.

4. (1919) A. J. P., aged 12, had been ill for two days, came from out of the city, and was operated the same day. We found a retrocecal, perforated, gangrenous appendix with retrocecal abscess and a generalized peritonitis present. The appendix was removed, ether poured into the abdominal cavity, and rubber tubing drainage was used. He lived for two days and succumbed to the combined ravages of a severe infection, general peritonitis and the development of an ileus.

5. (1919) S. T., aged 17, had been ill for four days, when first seen in consultation. At operation the same day, a perforated, retrocecal appendix and pelvic abscess with ileus in the pelvis was encountered. The peritonitis was generalized. The appendix was removed, ether was poured into the abdomen and rubber tubes inserted. Eleven days after operation an ileus developed in the pelvis and the patient died after the secondary operation for relief of the ileus. Perhaps the secondary operation for the secondary ileus was delayed too long, but we feel that the presence of the rubber tubing was a strong factor in this case.

6. (1919) H. A. was ill for several days, and at operation a perforated appendix with abscess and general peritonitis was encountered. The appendix was removed, ether poured into the cavity and rubber tubing used for drainage. Death occurred three days later, following development of bronchial pneumonia and ileus.

7. (1921) A. J. K., aged 26, took a strong cathartic, was seen on the second day of illness, operated upon that day, and we found general peritonitis, abscess, gangrene, and Lane's kink. The appendix was removed, ether used, cigarette drains inserted. An ileus developed on the fourth day with general peritonitis and death occurred on the next day after the second operation. Death was due in part to mitral heart disease with myocardial failure.

8. (1923) J. L., aged 42, was admitted on the second day of his illness, drove in from out of the city, and was operated upon that day. A general peritonitis, abscess ileus, gangrene with necrosis in many areas of the bowel, and thin pus were present at the operation. The appendix was removed, ether, cigarette drains used, the time consumed being seventy-five minutes with local and general anesthesia. His condition was poor while on the table. Improvement gradually con-

tinued after operation, with some evidence of gangrene of the bowel, and occasional hemorrhage into the bowel, but all went well until about the twenty-first day after operation, when he became toxic, his heart failed to respond to treatment and death intervened on the twenty-third day after operation—a heart death.

9. (1923) W. M. C., aged 30, was admitted on the fourth day of the disease, and operated upon the same day. At operation a generalized peritonitis, a perforated, retrocecal appendix with abscess, and ileus were present. The appendix was removed, ether used, and two cigarette drains were employed. At secondary operation sloughing of the ileum and general peritonitis were found. Death occurred on the fourteenth day after the primary operation. The condition was complicated by the presence of a goiter.

10. (1925) Mrs. K. M., aged 87, had a history of several attacks, was first seen and operated upon on the second day of her last illness. At operation a local peritonitis, abscess, and a gangrenous retrocecal appendix with thick exudate over the cecum were found. The appendix was removed under local anesthesia, a drain inserted, operation time fifty-five minutes. On the fifth day the wound opened and was resutured under gas anesthesia. Hypostatic pneumonia developed and death occurred on the fifth day after the primary operation.

11. (1925) F. A., aged 25, was admitted on the tenth day of his illness, gave a history of use of cathartics and was operated on the next day. It was found that the retrocecal appendix was gangrenous and had sloughed so that the base could not be found, that an abscess had formed and an ileus had developed with a general peritonitis. The appendix was removed, ether was used, and two cigarette drains. Ileus developed again on the third day, a secondary operation was performed, and death resulted from the general peritonitis on the fourth day after primary operation.

12. (1925) H. L., aged 71, was seen in consultation on the third day of illness, and operated that day. At operation a general peritonitis, abscess, ileus, thin pus, and a gangrenous appendix were found. The appendix was removed, ether used, cigarette drains employed, but death resulted from the general peritonitis and ileus on the second day after operation. Age was a factor in this case.

#### CONCLUSIONS

1. The mortality from appendicitis has increased during the past fifteen years. Familiarity has apparently bred contempt, but appendicitis still belongs to the sphere of major surgery.

2. Because of the incidence of acute suppurative appendicitis every tyro should not be encouraged to operate such serious surgical cases.

3. Surgical intervention should be instituted as soon as a diagnosis is made. The earlier the

diagnosis and intervention the lower the mortality.

4. The removal of the appendix at the primary operation is the method of choice, especially in skilled hands.

5. The factors of age, sex, presence of fecolith, or location of the appendix, do not seem to contribute anything to the mortality rate from this disease.

6. The factors of delay (permitting extension of the process), the presence of gangrene, perforation, abscess, peritonitis, ileus, at operation are attended with definitely increased mortality rates.

7. The presence of or development after operation of complications such as ileus, general peritonitis, cardiac and pulmonary conditions is a factor in increased mortality.

8. The presence of, or development of, post-operative secondary abscess, fecal fistula, and hernia does not contribute to increased mortality figures.

9. A loop of bowel adherent in the pelvis should be searched for and gently liberated. This procedure will do much to lessen the incidence of post-operative ileus.

10. Ether has been found to be of value in the treatment of suppurative appendicitis, because of its antiseptic, coagulating, and stimulating properties.

11. The use of the Penrose cigarette drain is a step forward in drainage of the peritoneal cavity.

12. Fecal fistulae have not been seen since the use of the Penrose drain.

13. The Minneapolis Surgical Society is urged to take the initiative in the direction of increased surgical efficiency in Minneapolis, and to encourage the coöperation of surgeons and hospitals in maintaining accurate and complete records so that studies in efficiency may be undertaken.

14. The Minneapolis Surgical Society is also urged to initiate the proper movements to the end that the public at large will from time to time be informed of the dangers in delay after onset of an acute appendicitis.

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## DISCUSSION

DR. H. B. SWEETSER: I think no apology is necessary for the introduction of the subject of suppurative appendicitis for the reason, as Dr. Sivertsen shows, that there is a yearly average of 16,000 deaths, mostly in the productive age. This is a high mortality for the disease which we had thought we had under control. The reasons for this increased mortality are probably various, but I think delay in proper treatment is probably the most important cause. Possibly such delay may have an economic basis, for people worry much about the cost of sickness in these days of the high cost of living, and are very apt to think that pain in the abdomen may not amount to very much, and in very many cases will take a cathartic and will wait a day or two before they send for a doctor. This practice of taking cathartics in the presence of pain in the abdomen is, because of delay, one of the main factors in the increased mortality of suppurative appendicitis. Another factor causing delay is the practice of doctors giving morphine to relieve pain before a diagnosis is made or before consent is obtained from the patient to submit to any treatment that may be advantageous, especially operation. It is very difficult to be called to see a patient who is suffering from acute pain in the abdomen, and tell them we cannot give them anything to relieve this pain until we have decided just what is the matter, and, in case an operation seems necessary, until we have received the consent of the patient to such plan of treatment. Unfortunately the giving of a hypodermic of morphine may both mask the characteristic symptoms, making diagnosis difficult, and allay the apprehension of the patient and make him think he is not seriously ill. In this way many hours of valuable time may be lost. It is equally difficult to educate people against the taking of cathartics, and doctors against the giving of morphine before a diagnosis is made. Dr. Sivertsen's statistics show the important part that delay plays in the high mortality of acute suppurative appendicitis. His report shows that cases operated within the first 24 hours had no mortality; those operated the second day had a mortality of 13 per cent; those on the third day, 19 per cent; those on the fourth day, 20 per cent; those on the fifth day, 9 per cent; and cases operated on later than this had a still lower mortality. So we see very clearly that early diagnosis is of the greatest importance in the disease, but an early diagnosis is not always easy. In typical cases even a lay person can guess what is the matter, but in atypical cases diagnostic skill is very often necessary to arrive at the proper conclusion. Thus a doctor may see a patient who gives a history of having had a moderate amount of pain a few hours before, who, upon examination, has no increased tem-

perature, a normal pulse rate, a normal or moderately increased leukocyte count, practically no tenderness, and who does not feel very sick. We all know that such cases, upon operation, show a gangrenous appendix, or one that has already ruptured. These are the patients who give us trouble, for we find that we may operate and find a normal appendix, whereas, if we delay, we may eventually have to deal with a very serious and possibly a fatal intra-abdominal lesion.

Dr. Sivertsen failed to mention a rather rare but very fatal complication, namely, secondary abscess of the liver. This is a very tragic complication, as it manifests itself generally about the time that the patient feels well and is ready to leave the hospital.

As regards technic:

1. I think it is very important to make an incision large enough to see all the pathology present without working in the dark. A large incision does not increase the risk of hernia, and it does increase the safety of operation.

2. I practically always make a right rectus vertical incision. I find this can be extended in either direction more easily than can a gridiron incision.

3. Where the appendix is not ruptured it may be removed as easily and as safely as an interval operation, and the abdomen closed without drainage.

As regards drainage:

1. In cases where the appendix is not ruptured, and there is no peritoneal exudate, or even if there is some exudate, if this is sterile, no drainage is necessary.

2. However, if there is any doubt about the matter, a cigaret drain, which may be removed in 24 hours, may be used, and thus relieve a surgeon's anxiety.

3. In acute cases I think it is unwise to tie the stump and then turn it in with a pursestring suture. This technic produces a small closed pocket. I had one fatality from acute sepsis, where the intra-abdominal finding was a few drops of pus in such a little closed pocket.

4. Where there is a large abscess the abdominal wound may be left widely open, and a large cofferdam drain of rubber tissue and gauze used. Of course, under no circumstances should the gauze be allowed to come in direct contact with the peritoneal surface.

5. I agree with Dr. Sivertsen as to the advantage of a cigaret drain over rubber tubing, although I do not think that the rubber tubing is as important as he does in the producing of fecal fistula. I think the fistula is mostly due to the primary pathology of the disease. In draining the Douglas cul-de-sac I practically always use a rubber tube, as the operating rooms generally do not provide cigaret drains long enough to reach the bottom of this cavity.

Sometimes in neglected cases an abscess may be so large that simple incision of the abscess without invading the general peritoneal cavity is a life-saving measure. Also, in very young children who do not stand prolonged operations, if the abscess can be felt from the rectum, drainage of this will be a determining factor as to the result.

Concerning moribund cases: Dr. Sivertsen advocates operation on all cases irrespective of the time when

seen. If the patient looks as if he were about to die, it may be unwise to subject him to operation. Of course most of these cases will die, but occasionally one may be tided over to a point where he may be operated safely.

As regards the use of ether as a local application to sterilize the infected area, I also use this routinely in cases that have been anesthetized, but I wish to give a warning that ether produces great pain, as I have found from experience, and would advise that it would not be used when the patient is being operated under local anesthesia.

Concerning closure of the abdominal wound:

1. If there is a large amount of infection, it may not be wise to close the wound at all, as I mention above, but to pack it with gauze protected by rubber tissue. Hernia will probably result from this, but hernia is a secondary consideration in case of virulent suppurative appendicitis, when what we wish to do is to save the patient's life.

2. When the abdominal wound is closed, it is very important to avoid tight closure. There is always more or less secondary swelling, and tight closing may produce strangulation and necrosis of the aponeurosis and consequent swelling, long period of convalescence, and inevitable hernia.

In closing I want to congratulate Dr. Sivertsen and I am very glad he brought this subject before the Surgical Society and I hope that at least once a year we will have a paper of this type read.

DR. S. R. MAXEINER: I had the pleasure of reading Dr. Sivertsen's paper and I agree that there is no apology necessary for bringing a topic like this before us. I think Dr. Sivertsen has brought up a very important subject. Twenty per 100,000 of the people in Minneapolis die from appendicitis, directly or indirectly. I may be a bit old fashioned but I still use rubber tubing and insist on it for the perforated cases. I have used two tubes and I usually split the tube so that the drainage will come in at all points. The first tube goes into the pelvis and the second tube into the kidney region. It will catch up the drainage of pus that goes outside of the colon into the kidney region.

I think differential diagnosis in a typical case needs no further discussion. In the atypical case I have seen a number of the best men fail to make a diagnosis. I have also seen them open the upper abdomen and find a perforated appendix. The General Hospital gets a lot of these long neglected cases. One of the causes of a distended small bowel above the appendix is the fact that the appendix is lost under this loop of small bowel. Its action upon the bowel itself causes an acute distention of the bowel above it. In such cases a large rubber catheter should be inserted through the opening of the cut-off end of the appendix and through the ileocecal valve and an ileostomy performed. We do get a lot of gas out of the bowel with such a procedure.

I have been using ether largely. Only recently I had the privilege of seeing a case with one of our good men at St. Mary's in which I helped and our judgment

was to take out the appendix. Operation was delayed in the hope that we might get him in a little better condition. About twelve hours later we operated. We tried to take the appendix out but the patient died. May he not have had one more chance in five hundred if we had not looked for the appendix and taken it out?

The incision which I prefer and which I always use is McBurney's incision if I am certain of my diagnosis. It puts you over the site of the pathology. I have repeatedly removed the appendix without getting into the peritoneal cavity. I do not even see any small bowel and I do not want to contaminate any small bowel unless I can help it. Handling of the tissues cannot be too much emphasized. I think perhaps that is one of the advantages in local anesthesia. The man who does them under ether may be very bunglesome and may cause a great deal of trouble. Local anesthesia teaches us, if nothing else, the respect for tissue. I drain all my cases with rubber tubes and I have had comparatively few fecal fistulas. Fecal fistulas occur in the cases in which, just as Dr. Sweetser says, you get thrombosis of the veins and have interfered with the blood supply of the cecum. You are very apt to get a necrotic spot in the cecum regardless of whether there is drainage or not.

To have a mortality of 20 per cent from chronic appendicitis is altogether too high. I am even more liberal than Dr. Sweetser in giving morphine in pre-operative treatment.

DR. R. C. WEBB: Dr. Webb said that he felt that the society was to be congratulated in having the statistics of appendicitis in the city of Minneapolis presented in this manner by Dr. Sivertsen. He said that he fully appreciated the variability of surgical statistics in this treacherous disease but he felt that as statistics go Dr. Sivertsen's report showing twelve deaths in one hundred and thirty cases was really very high. Dr. C. E. Farr reported 818 cases of acute appendicitis with a mortality of 4.15 per cent on Gibson's service at the New York Hospital. The Gibson drain was used in one hundred and sixty-two of these, that is, in approximately one out of five which were the most serious cases and in these the mortality was 12.3 per cent.

Dr. Webb showed a series of lantern slides illustrating the use of the Gibson method of drainage. He said that he felt that this drain not only lowered the mortality but that in discussing methods of drainage one should also reckon in terms of morbidity. It is practically impossible to get a patient out of the hospital in less than twenty days when this drain is required but the average stay is 22.4 days with the drain. He felt that when this type of case was drained by ordinary methods the hospital stay was nearer twice this time.

Dr. Webb said that he questioned the value of ether in the peritoneal cavity. He said that he had recently had an acutely inflamed appendix perforate at the time of operation and a previously clean field became seriously infected. The surgeon assisting wished to wash the wound with ether and this was done. There was

the usual evidence of infection present with no apparent influence from the ether. It is well known that ether causes serious discomfort to the abdominal contents if the anesthetic is local. He asked if anyone had any evidence of the value of ether in the peritoneal cavity other than that of local tradition.

DR. ARTHUR F. BRATRUD: The mortality in operations for acute appendicitis is too high. In a series of over 700 cases done at the Warren Hospital, we had a mortality of 2.5 per cent. After forty-eight hours the Ochsner treatment was followed, except in cases where the abscess pointed in a definite location. Drainage in the right lower quadrant was practiced when the abscess pointed in that location. Rectal drainage was performed when abscess pointed in the cul-de-sac. All cases received within 36 to 48 hours were operated upon.

No case should be interfered with surgically on the third, fourth or fifth day, as it is a recognized fact that in this period the mortality is high.

Drainage should be used where the serosa is dry and has gangrenous patches; for this no hard rubber tube should be used, as there is the danger of injury to the vessels and resultant thrombophlebitis. The question of whether soft rubber tissue, soft rubber tubes, Gibson or Mikulicz drains should be used, depends on the individual cases, and whether the bowels must be held out of the pelvis in order to prevent obstruction. No wounds should be sutured, but merely strapped by the method of MacLaren of St. Paul. This gives a clean wound, with no infection of fascia, subcutaneous tissue or skin. I believe this added infection in the abdominal wall in some cases where the wound has been sutured causes just sufficient added toxemia to cause death; for it is remarkable the amount of infection that the peritoneum will take care of. The cases with wound not sutured leave the hospital on an average of twenty-one days, with the wound fairly well healed. Should operation for hernia be required later, there is always good fascia and plenty of it to effect a good closure.

#### KEROSENE

Kerosene is a weak antiseptic and parasiticide and irritant to the skin. Therefore: It can be used for parasitic affections of the scalp. It is of some use for seborrheic dermatitis of the scalp and, if it has any effect in preventing the outfall of hair, it is presumably due to its irritating—stimulating—effect on the skin. But it does all these things in a crude, disagreeable way. All of them can be done more efficiently and much more accurately with drugs of definite composition. Its vogue as a hair tonic and hair restorer is largely due to that popular feeling, which has come down through the millenniums from our barbarous ancestors, that the efficiency of drugs is in proportion to their disagreeableness. (Jour. A. M. A., June 25, 1927, p. 2048.)

#### OBSERVATIONS ON PNEUMONIA BY A COUNTRY DOCTOR

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It is with considerable trepidation that this article is written on such a common and well understood subject as pneumonia, but after treating sixty-five cases of this condition in the last two winters, all in the home, I was prompted to set down some of the interesting features encountered. Thirty-seven in this series were treated while in practise in the northern part of the state, and the remaining twenty-eight cases were encountered in this community during the current fall and winter.

Pneumonia is a very common disease, especially in this climate, and comprises a large proportion of the conditions the general practitioner is called on to attend in his daily work. The occurrence of disease in this series showed a marked seasonal variation, being greatest in the winter and early spring, about 75 per cent occurring in January, February and March of the respective winters. Of this series the ages of the patients varied from three months to fifty years. About 50 per cent were in individuals under eight years of age.

*Types.*—Bronchopneumonia was present in sixty of the sixty-five cases, and only five cases could be classified as true lobar in type. Of the twenty-eight cases treated this winter, two were true lobar, one being in the upper, the other in the lower lobe of the right lung. True lobar pneumonia with the typical text-book picture, has in my experience rarely been seen.

*Symptomatology.*—The temperature in these cases varied from 100 to 104.5 degrees. In the majority, the relatives had their first premonition of some serious development and called the doctor because the patient was "feverish." Cough was a very common and constant symptom, usually preceded the attack, and was generally dry, harsh and unproductive when the patient was first seen. An increased respiratory rate with dyspnea was the symptom usually first noticed in babies and small children. I have found that dilation of the alæ nasi with each respiration is one of the most reliable signs of beginning pulmonary congestion. In many of the pa-

tients old enough to express themselves, pain in the chest on inspiration was a common complaint. This was often found in cases where as yet no demonstrable pathology was present in the chest. Pain was usually designated as being present in the lower part of the chest. About 30 per cent of the series was ushered in by a severe chill, and significantly these cases proved to be the most refractory to treatment. In some of the patients, the physician was not called until the relatives noticed the production of the characteristic, sticky, rusty prune-juice sputum. This was present in the lobar cases, but I also saw it in many of the bronchopneumonia type, where I could make out no definite lobular involvement.

Clinical findings in the bronchopneumonia patients varied, depending on the time I was called. In some cases resolution had begun to take place, and in others the process had just commenced. Findings at the onset, however, were all similar: a duller percussion note over the affected areas, a decrease in breath sounds, and in many cases in this stage crepitant râles could be elicited by cough. Later, sometimes on the visit on the following day and sometimes three to four days later, there were patchy areas of bronchial breathing and moist râles which increased with resolution of the process. One important sign, in all early cases of bronchopneumonia and lobar pneumonia, which has enabled me to diagnose an approaching pneumonia in the very early stages, is the auscultation of the whispered voice—pectoriloquy. This finding, in my experience, has always heralded the approach of a pneumonic condition. In the lobar types, the findings were similar throughout the same stages, with the exception that the inflammatory process could be definitely localized in a lobe or in one lung. Percussion here was very helpful, because the affected lung area could be easily mapped out by this method.

*Treatment.*—All patients in this series were cared for at home. In only ten instances was it possible to secure the services of an experienced nurse, and then only practical nurses were available. Usually the mother or some relative acted as nurse and attendant to the patient.

Undoubtedly everyone in general practice is familiar with some of the local applications frantic relatives will smear on the chest in the hope

of affording relief. I have discovered many "old timers from Grandma's time," used to put on the patient's chest. In practically all of these cases, I would find the patient greased with some absurd mixture on my first visit, which I promptly dispensed with. The most common of these topical medications, used or recommended by solicitous relatives or helpful neighbors and friends, were goose grease, fried onion poultices, skunk oil, turpentine and lard, and camphorated oil. I never could conceive of the possibility of any local application being able to penetrate skin, fascia, muscle, bone, and pleura and reach the seat of infection in the lung. But all of the relatives would have great faith in topical application, and as I knew from experience they would rub something on the chest, whether I recommended it or not, I usually suggested camphorated oil, as being the least harmful, and incidentally the cleanest; and its odor served not only to give a sick room odor, but seemed to soothe the relatives as well.

A pneumonia jacket was insisted upon in all cases. An excellent jacket can be made from cotton and soft cheesecloth, with about a two inch thickness of cotton between a couple of thicknesses of cheesecloth, the jacket reaching from the neck to the waist. I used dry, never wet, pneumonia jackets on all these cases. I also advised warm bedclothing, flannel night-shirt or pajamas preferably, depending however, on the bedclothing the individual was in the habit of wearing.

Rest, I feel, is the most important item in the treatment of the pneumonic infections. At the onset the mother was told in very emphatic terms the necessity of absolute rest for the patient, the importance of keeping the patient quiet, not allowing him to sit up in bed, and the insistence absolutely on the use of a bed-pan. The attendants were then told of the necessity of forcing fluids, and the benefit to be gained by such a procedure. I usually asked them to see that the patient consumed a glass of fluid every hour. Water was, of course, the most important liquid, but in case the patient tired of water, he could substitute orangeade, lemonade, milk or cocoa. The diet was then carefully explained to the mother. One has to be specific and mention the articles of food that the patient can eat, because frequently injurious items are given to the sick



one. I have used a high carbohydrate diet with excellent results. It provides not only an easily assimilable food, but energy in the form of the absorbed sugar. The attendant was told to sprinkle liberal portions of sugar on all food served to the patient. The diet given to the older patients was Cream of Wheat, oatmeal, milk toast, orange juice, ice cream, junket, soups and gruels, and during convalescence egg-nogs in addition. For babies, either breast-fed or artificially fed, diet was particularly stressed, because I have found that once nutrition is interfered with, a fatal termination almost always results. The care of the bowels was explained to the attendant. When first seen, patients were given a Cascara laxative, but after the first day, laxatives were used sparingly, because of the attendant unrest to the patient. The attendant was instructed to give the patient a low soap-suds enema every morning, and the use of a bed-pan insisted on. Fresh air and its importance in the treatment of this disease was explained to the attendants. I believe in plenty of fresh air in these cases, but I don't believe in having a freezing temperature in the sick room. There is such a thing as warm fresh air. The temperature of the sick room was kept from 50 to 60 degrees F. Windows were let down from the top, so as to insure plenty of circulating fresh air, but the patient was protected from drafts. Relatives and visitors were cautioned about entering the sick-room. Not infrequently I would find the entire family, five to eight in number, clustered around the sick-bed, thus further complicating the fresh air problem. Everyone was told to remain out of the room, with the exception of one or two attendants. Fever in the patient I found to be one of the greatest worries of the relatives. This did not alarm me particularly, and I explained to those in attendance that the fever was a physiological process and to be expected in this disease, that powerful drugs to overcome it would cause definite injury to the patient. I used no antipyretic drugs but relied on temperature sponges and pushing of fluids to control this symptom. In all cases over 103 degrees the patient was sponged with tepid water, followed by an alcohol rub every four hours as long as the temperature remained above 103. In some of the series where a persistent hyperpyrexia was present, packs of 50 per cent alcohol and water applied to the chest

for one half to one hour at a time, served a very useful purpose.

I used few drugs in the treatment of this series. In infants and young children Elixir Terpin Hydrate cum Codeine was used, with the addition of Syrup of Hydroiodic Acid, in the unproductive cases. Mustard plasters may sound a bit old fashioned, but they helped a good deal, especially in infants and children. I prefer this to the mustard bath because it is less fatiguing to the patient, and easier to apply. The results have been just as good in my experience. These plasters were made by mixing one part of ground mustard and three parts of flour, with hot water added to make a paste. This was put between two pieces of cloth, large enough to cover the posterior chest, and another similar plaster prepared for the anterior chest. They were applied as hot as the patient could stand and left on from fifteen to thirty minutes and then removed. Applying olive oil to the skin afterwards prevents irritation of the skin. Usually three and sometimes four of these a day were advised. I have had excellent results with these in children, and feel confident that resolution and recovery was hastened two to three days by their use. Mustard plasters in children over twelve and in adults gave no results whatever and I have abandoned their use entirely in these older cases. In loosening the cough and relieving the harsh unproductive cough, in infants and small children, I have used steam inhalations with excellent results. Either plain steam from the teakettle or the addition of a teaspoon of Compound Tincture of Benzoin to a quart of water can be used. The mother here had to be instructed in the preparation of a croup kettle; a funnel was made out of newspaper and the small end attached to the steaming spout of the teakettle, and the steam conducted to the patient's bed through the funnel. They were kept up for about thirty minutes at a time, four to five times daily. This gave excellent results, especially in cases of a croupy character, where there was some laryngeal involvement as well as pneumonia.

The drug treatment in the adult cases was somewhat different. They received a cough mixture containing one-third to one-half a grain of codeine in each dose, with some mild expectorant. To all adult cases, at the outset, Tincture

of Digitalis was given. They received 25 minims four times a day for the first three days, and then 15 minims three times a day. This was given to support the heart and circulation. Morphine was used in adults whenever necessary to secure rest. It was given in small doses, and served to give relief from the racking and exhausting cough, and was conducive to much-needed and beneficial sleep. Of the stimulants used, for the critical cases, Caffeine Sodium Benzoate and Atropin Sulphate, both hypodermically, were used with the best results. In four of the cases, whisky was used along with the other measures. It was given in dram doses every three or four hours. I feel that the alcoholic content in whisky not only serves as a stimulant but also provides food and energy. Personally, I don't feel it is to be advocated as a routine treatment, but in certain cases serves a useful purpose. All of these four cases made excellent recoveries.

**Complications.**—These were few in this series of sixty-five cases. Two patients died, one an infant with a complicating meningitis, and the other an adult forty-two years old, who developed an active tuberculosis with positive sputum and died on the twenty-first day of the disease.

Ten of the infants and small children developed otitis media, and puncture of the drum was necessary in a few instances.

The diagnostic needle was used in several cases to determine the character of a pleural exudate, where it was felt an empyema might be developing. Small amounts of fluid were found in three cases, but pus in no instance. Not infrequently pus will be found on doing a thoracentesis, and then of course rib resection is necessary.

While albumin was found in the urine on several occasions, only one definite case of pyelitis developed in this series.

The time of the crisis in these patients varied greatly. Some developed the crisis in two or three days, and the longest time was ten days.

**Aftercare.**—The aftercare of these patients is particularly important. Depending on the severity of the case they were kept in bed seven to fourteen days after abatement of the fever and the symptoms. On the first day up, they were allowed to sit up in a chair fifteen minutes in the morning and thirty minutes in the afternoon. This was gradually increased daily. In practically all over ten years of age, a productive cough lasted for from one to three months after recovery. Creosote Carbonate seemed to assist in clearing up chronic coughs. Some were asked to come into the office for frequent lung examination, and in suspicious cases, the sputum was examined frequently. In doubtful cases x-ray examination of the chest was ordered.

#### ABSORPTION OF VITAMIN D THROUGH THE SKIN

The antirachitic factor, now commonly designated as vitamin D, which seems to be essential for the proper development and maintenance of the skeletal structures, apparently is not produced within the living body of man. The necessary supply is ordinarily derived either through the ingestion of antirachitic foods or through exposure of the skin to sunlight or ultraviolet rays. The last mentioned method is somewhat uncertain with respect to precise dosage. The alimentary path of introduction of the vitamin is usually the most convenient method for antirachitic therapy. Sometimes, though rarely, there may be barriers to its use; hence alternative procedures have been looked for. It has been found that the subcutaneous administration of cod liver oil may lead to curative results attributable to the fat-soluble vitamins. It has now been found that vitamin D as it is secured in irradiated sterols can be absorbed from the uninjured skin. The possibility of antirachitic therapy by inunction is thus presented. (Jour. A. M. A., June 18, 1927, p. 1970.)

#### SPAHLINGER TREATMENT OF TUBERCULOSIS

Notwithstanding the fact that the Spahlinger treatment of tuberculosis was secret and that evidence in its favor had not been made generally available, Spahlinger and his friends have repeatedly attempted to secure government endorsement of the preparation in England and to secure funds for its development. Now the records of ten patients injected by Spahlinger personally with this remedy have been reported by Dr. Thomas Nelson in the London Lancet. These records are decidedly unfavorable to the treatment. The evidence in favor of the Spahlinger method of treatment of tuberculosis is not sufficient at this time to warrant an extensive trial. The burden of proof is still on Spahlinger, who should at least show that in a considerable number of cases studied under controlled conditions the remedy will accomplish more than can be accomplished by the method of treatment now practiced in well regulated institutions for the treatment of tuberculosis. (Jour. A. M. A. Jan. 22, 1927, p. 248.)

## THE PREVAILING TYPE OF TUBERCULOSIS OCCURRING IN CHILDHOOD\*

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From the results obtained through the application of the Von Pirquet and Mantoux tests it is known that a vast army of children harbor a tuberculous focus (healed or unhealed) within their bodies. In a certain percentage of these children the clinician is able to demonstrate that the tuberculous process involves the bones and joints, the cervical lymph nodes, the brain and meninges and in a small group of cases the lesion is found involving the parenchyma of the lung. The combined total of these cases, however, constitutes only a small fraction of the multitude of children having positive tuberculin tests. It appears, therefore, that an inconspicuous lesion exists in the majority of these children, and the writer feels convinced from his experience as pediatricist at the Lymanhurst School for Tuberculous Children that this lesion represents the prevailing or common type of childhood tuberculosis. This common type of childhood tuberculosis apparently consists in an involvement of the glands at the hilus of the lungs, for among some 4,000 children examined at Lymanhurst, enlargement and calcification of these lymph nodes was, in the vast majority of these cases, the only lesion that could be demonstrated by most careful and thorough clinical and x-ray examination.

Many physicians, no doubt, can recall frequent instances where, in the course of the examination of a child running a slight fever, complaining of vague symptoms of fatigue and having a positive cutaneous reaction to tuberculin, the lungs are found to be absolutely free from disease. Physical examination and roentgen-ray plates in these instances, however, frequently reveal the presence of enlarged and calcified lymph glands at the hilus of the lungs. In addition, the x-ray may also demonstrate the presence of a tiny calcified lesion within the lung, adjacent to the enlarged hilus glands, which may be interpreted to be the primary tuberculous focus. When confronted with this meager array of find-

ings appearing in the presence of a known and definite previous tuberculous infection as demonstrated by the positive cutaneous reaction to tuberculin, the clinician may find himself perplexed and at a loss to designate the condition existing in the patient by any term or diagnosis known, accepted, and understood by physicians in general. Furthermore, if he looks over the usual classification listed on various sanatorium application blanks, no classification or diagnosis is found by which this common type of childhood tuberculosis may be satisfactorily designated. However, in order to conform with established classifications, the physician may finally arrive at a diagnosis of incipient tuberculosis, and feel somewhat justified if not entirely satisfied with this conclusion through his knowledge that the detection of the disease in its incipient stage is difficult, is often missed, and thus may be present in the case in question, although undiscovered. The general tendency to think of tuberculosis as a pulmonary disease, particularly when its presence cannot be demonstrated in other parts of the body, may also influence one to incorrectly diagnose many of these children as having incipient tuberculosis, thus implying the presence of a minimal pulmonary lesion. Although pulmonary tuberculosis is the common type of the disease seen in adults, it is relatively seldom found in children, in spite of the fact that tuberculous infection is extremely common in childhood. Since pulmonary tuberculosis is relatively uncommon in children, it is evident that a diagnosis of incipient tuberculosis which implies the presence of an active pulmonary lesion is incorrect when applied to these cases. This is substantiated by the experience of the physician who sees these children having vague symptoms and positive tuberculin tests promptly return to good health when given proper care, or survive when apparently grossly neglected. These children practically never experience the disability or prolonged illness seen in adults in whom a correct diagnosis of incipient tuberculosis is made. The lesion found in the majority of children having positive tuberculin reactions unquestionably is distinctly different from that commonly occurring in adults and the prognosis is favorable.

Recently, the National Tuberculosis Association has adopted the report of the Committee on

\*Read before the Staff of Glen Lake Sanatorium, Oak Terrace, March, 1927.

Classification of Juvenile Tuberculosis, and has added a new term, *hilum tuberculosis*, to the present classification by which this common type of childhood tuberculosis may be properly designated. For a discussion of the details of the criteria upon which a diagnosis of hilum tuberculosis may be made, the readers are referred

to the report that diagnoses of cervical gland, bone or other types of tuberculosis do. A clear conception of hilum tuberculosis also greatly simplifies the problem of the physician in properly diagnosing and evaluating the inconspicuous tuberculous lesion found in the majority of children with positive tuberculin reactions. Hilum tuber-



Fig. 1. X-ray showing calcified cervical glands in a girl aged 15.

to the Report of the National Tuberculosis Association for 1925. In this article it will suffice to state briefly that a diagnosis of hilum tuberculosis should be based upon a combination of findings including a positive cutaneous tuberculin reaction, fatigue, under-nutrition, slight elevation in temperature, no pathology demonstrable within the parenchyma of the lungs, and x-ray evidence of definite enlargement and calcification of the lymph glands at the hilus of the lungs. In addition, other infections which may simulate this type of tuberculosis must be excluded. To those acquainted with the requisites upon which a diagnosis of hilum tuberculosis is based, the term, when used, will immediately convey a definite conception of the pathological condition found in the child, to the same ex-



Fig. 2. X-ray showing calcified cervical glands in a boy aged 11.

culosis of childhood is a condition having a good prognosis, for in the vast majority of these children the lesion tends to heal completely. For some apparently unknown reason, tuberculosis of glands in this region does not tend to suppurate with subsequent sinus formation as is common in tuberculosis of cervical lymph glands.

Children having hilum gland tuberculosis, properly diagnosed, do not require sanatorium hospitalization. The establishment for these children of schools such as the Lymanhurst school where the child receives medical supervision and instruction in personal care and hygiene is an ideal arrangement. Medical supervision of such cases is advisable, with special attention directed toward their restitution to proper nutrition, the provision of ample rest, and a general observance of régime conducive to the promotion of



good health. After a period of supervision when the nutrition is restored to normal, and no evidence of any activity of the lesion remains, the condition may then be diagnosed as healed hilum tuberculosis, even though the tuberculin reaction continues to remain positive.

From the foregoing it is seen that this common type of childhood tuberculous lesion is a glandular involvement, the hilum gland involvement being apparently far more common than tuberculosis of glands in other parts of the body in children. Although it is well known that the glandular pathology in the region of the hilum may be demonstrated, usually by means of the *x*-ray, the possibility of demonstrating the presence of lesions in lymph glands in other parts of the body, particularly in the cervical region, and also in the abdomen by roentgen examination, apparently has not received the attention it deserves. The presence of calcified intra-abdominal tuberculous lymph nodes as revealed by the *x*-ray plate has been the subject of recent articles by L. A. Rowden and Dunbar<sup>1</sup> and Smythe.<sup>2</sup> Also in the cervical region calcified glands may be demonstrated by means of the roentgen ray, as shown recently by Hanford,<sup>3</sup> who feels that the presence of calcification in the cervical lymph nodes is strong evidence that they are tuberculous, a point which may prove of value in differentiating this condition from other diseases of lymph glands in this location.

Recently at Lymanhurst several children have been found to have calcified cervical lymph nodes demonstrable by *x*-ray plates. The calcification present in two cases is shown in Figures 1 and 2. In these cases a diagnosis of tuberculous cervical adenitis has been made as a result of careful clinical study. In several other cases of undoubted tuberculosis of the cervical lymph glands in which suppuration with sinus formation and later scarring had occurred, calcification could not be demonstrated by roentgen examination. Apparently in these instances the

calcified material had been completely discharged through the sinus that had formed.

#### SUMMARY

In children having a positive cutaneous reaction to tuberculin and presenting such symptoms as under-nutrition, fatigue, slight elevation in fever, and demonstrable enlargement and calcification of the hilum glands with no evidence of parenchymal pulmonary lesion or other disease which might present these symptoms, a diagnosis of hilum tuberculosis should be made. In using this term in the sense recently approved by the National Tuberculosis Association, the classification conveys to physicians familiar with criteria upon which such a diagnosis is properly made, as clear a conception of the pathological condition existing in the child as is implied in the more well recognized classifications such as bone and joint, incipient, moderately advanced and advanced pulmonary tuberculosis.

Hilum tuberculosis is a condition presenting an excellent prognosis, and requires only common sense medical supervision without sanatorium care.

The most prevalent type of childhood tuberculous lesion is a glandular tuberculosis, of which hilum tuberculosis constitutes by far the greater part.

The lesions (calcification) in the glands may be demonstrated by means of the *x*-ray in the hilum, and also in the cervical and abdominal regions.

When tuberculous cervical glands suppurate with sinus formation, the calcified material apparently is discharged through the sinus formed. In such instances frequently no calcium is demonstrable in these healed cervical glands by means of *x*-ray plates.

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#### "LIQUID ARVON" DERMATITIS

Liquid Arvon, put out by the R. L. Watkins Company, Cleveland, has been reported to contain 4.84 per cent of alcohol by volume, 1.49 per cent of glycerin, and 0.42 per cent of potassium carbonate, with salicylic acid present and probably resorcinol. This hair tonic preparation is reported to have caused severe dermatitis of the scalp. (*Jour. A. M. A.*, May 1, 1927, p. 1505.)

#### KLORON

Qualitative tests made in the A. M. A. Chemical Laboratory indicate that Kloron Tablets (J. I. Holcomb Mfg. Co.) contain Chloramine-U. S. P. as their potent ingredient. The claims made for the preparation are typical of the extravagant exploitation of official products by the "patent medicine" route. (*Jour. A. M. A.* Jan. 8, 1927, p. 119.)

## FACTORS IN THE PROMOTION OF HEALTH IN DULUTH\*

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During the summer and fall, considerable attention has been given in the newspapers to the fact that Duluth has a very low death rate. At times it has been, for a limited period, the lowest in the country among cities of its class. However, even in our community, there is a very considerable amount of preventable illness and death. About a thousand people die every year and about two thousand more are sick abed all the time. Approximately 3 per cent of all of us are literally put out of business, at least for the time being, and totally incapacitated.

A certain American humorist arrived in a town that had a death rate average of but one person per day and boasted of the fact to the lecturer. In great alarm he inquired whether anyone had died that day and after a messenger from the Court House had ascertained that the day's quota had passed to its reward, he went on with his lecture greatly relieved. How can we be reasonably sure that we and our folks are not among the every-day quota of the dead or disabled in Duluth without inquiring at the City Hall?

Advances in health security are based, as are advances in other lines, on accurate scientific knowledge. There is no hocus-pocus about it. Psychotherapy has its place and so has mechanotherapy, but blind surrender of community intelligence to pseudo-medical cults will not do much towards reducing death rates.

The father of modern medicine and surgery, Pasteur, was not a physician, but a pure scientist and research worker. He was no evolver of fanciful panaceas from his inner consciousness, but a faithful and patient correlator of observed facts, a tireless seeker after truth. His discoveries led to others that have greatly reduced the sum total of human suffering and have prolonged the average span of life many years. His dream that communicable diseases might be banished from the earth is coming true

and within limits a community may determine its own health.

The achievements of scientific medicine already recorded are astounding. Where 3,000 per 100,000 died annually in large cities, less than half that number now die (Ravenel: *A Half Century of Public Health*. N. Y. 1921, p. 101).

The marvels of surgery are well known to all of you. Pasteur's and Lister's work made it safe to open the abdomen and suppuration and gangrene which were formerly considered inevitable ceased. One by one great plagues have been controlled and sent skulking to the background. Small-pox, cholera, typhoid fever, yellow fever, diphtheria, tuberculosis are names that no longer strike terror in every heart as they did when they periodically swept thousands to premature graves. Reed, Lazear, Gorgas, Koch, Banting, Trudeau, and von Behring are glorious names in the history of medicine. Some were martyrs and should be revered as saints. In this case, it was not man's inhumanity to man that made countless thousands mourn, but man's humanity to his brothers that has given countless thousands reasons for rejoicing though they may not know or appreciate it.

Let us not forget in all our health propaganda that scientific medicine is the basis of health promotion and that we must consult the doctor and especially the medical research worker to know that we have solid ground for our projects and programs.

As regards Duluth, what are the facts about its situation and needs?

The death rate for Duluth in 1925 was 10.1 per 1,000 (U. S. Public Health Reports, June 11, 1926). In Austin, Minnesota, it was 9.8; in Racine, Wisconsin, 8.1; in Hibbing, 8.0; in Virginia, Minnesota, 7.7; in Bethlehem, Pennsylvania, 6.7. The rate for the entire country was about 12 per thousand. For the whole country in 1924 according to the U. S. Public Health Reports (January 1, 1926) the principal causes of death were:

	Per 100,000
Heart Disease .....	180
Apoplexy and Diseases of Arteries....	120
Pneumonia .....	98
Tuberculosis .....	91
Cancer .....	92

\*Read before the annual meeting of the Duluth Council of Social Agencies, Jan. 24, 1927.

Bright's Disease .....	90
Accidents, etc. ....	76
Diarrhea .....	43

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All other causes .....	400
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The infant mortality rate for the country averages about 72 per 1,000 births, but New York City had a rate of only 64, and Seattle as low as 45.

The general order of precedence as to causes of death was practically the same in Duluth in 1924 according to figures furnished by the Health Department. There were 166 deaths from heart disease, 106 from apoplexy and diseases of the arteries, 99 from pneumonia, 65 from tuberculosis, 79 from cancer, 49 from Bright's disease, 41 from various accidents, etc. The infant mortality was 63 per 1,000 births in 1925.

The death rate is a somewhat imperfect index of the amount of illness in a community, as many are ill with non-fatal maladies. It is usually assumed on the basis of various surveys that for each case of death there are two cases of constant illness (Modern Hospital, January, 1927, p. 81). There are, therefore, without doubt over two thousand people constantly ill in Duluth.

We can infer something of the character of the non-fatal diseases which are constantly attacking Duluth residents from the cases reported in 1925, which were as follows (U. S. Public Health Reports, September 17, 1926):

	Cases reported	Deaths
Typhoid Fever .....	12	1
Smallpox .....	8	0
Scarlet Fever .....	112	4
Diphtheria .....	15	0
Infantile Paralysis .....	20	2
Measles .....	23	0
Chickenpox .....	438	0

The most complete analysis of sickness prevalence ever made for any community has just been completed for Hagerstown, Maryland, by the U. S. Public Health Service (Public Health Reports, September 27, 1926). The population of this city is about 30,000. Of a thousand cases of illness in 28 months the distribution was as follows:

Colds and Bronchitis.....	420
Influenza and Grippe.....	140
Digestive Disturbances .....	100
Epidemic Infectious Diseases.....	80
Tonsillitis and Sore Throat.....	60
Disturbances of the Nervous System.....	40
Accidents or External Causes.....	40
Disease of Heart and Circulatory System....	20
Various Other Causes.....	100

Many factors are responsible for low mortality and morbidity rates besides organized health measures. The climate of a city, the average prosperity of its citizens, the character of the occupations followed, the density of the population, the housing conditions and ordinances, the water supply and smoke ordinances, the racial types resident, the kind of immigration taking place, the percentage of young people in the population. All these need consideration, but, whatever the effect of these conditions may be, there is no fact in human history better demonstrated than that a considerable degree of improvement in the health of any community can be secured by well directed, reasonable measures based on recent discoveries in medicine.

Communicable diseases can be controlled. Infant mortality and childhood morbidity can be reduced to a surprising degree. The experience of many cities gives eloquent testimony to such achievements and these two problems should be the major concern of our community. Already considerable progress has been made everywhere along these lines. As more children live to grow up and fewer people die of communicable disease, more attention will be given to the prevention of cancer, heart disease and various systemic and degenerative diseases.

Ten years ago, tuberculosis stood at the head of the list of causes of death, and a little earlier, typhoid fever had a prominent place. Many here present can remember the typhoid epidemic in Duluth in the nineties and the later one in Two Harbors. If it had not been for reduced death rates from these diseases, as many people as are present at this meeting would have died of them last year, who on the contrary are taking an active share in affairs. Perhaps half of those who would have been attacked are in this audience.

In 1901 the average expectation of life for a male child in the United States was 48 years;

now it is 54 and in Minnesota almost 60 years. In the eighteenth century in Massachusetts it under 30 years. What about the good old times? In Queen Elizabeth's time it was about 20 years.

The principal agencies directly concerned in the promotion of health in a community are the medical profession, the nursing profession, the hospitals and the health department. Their activities may be either in disease prevention or in its cure. Doctors, nurses and hospitals have been so largely concerned with the actual invalid patient and the relief of his complaints that the possibilities of achievement open to them in the prevention of disease have been overlooked. Prevention is, of course, at least sixteen times more valuable to the community than cure, but never seems as urgent. We must have doctors and good doctors when we are sick but we do not realize how much we need them when we are well. We will willingly pay from 50 to 500 dollars every year to have the automobile overhauled and kept in good running order but we begrudge the doctor five dollars for an annual once over for our bodies on our birthday.

We don't take the car to a tinker but to the best auto mechanic we can find. Many medical men have spent some years in pre-medical work, four years in medical college and a year or more in post-graduate study in hospitals.

There are about 130 physicians in Duluth, a proportion of about one to 800 people. For the whole country there are about 160,000 physicians—a proportion of one for less than 800, for Minnesota 2,823 or about one for 830 people. So Duluth is well supplied but not over supplied with competent physicians.

Why should not the average citizen go to his doctor and say: "I want to engage your services for a periodical check-up of the health of myself, my wife, and my children. For this service, I am glad to pay you a hundred or two hundred or five hundred dollars a year. I know your time is valuable but I know your reputation and skill and I want you to keep us well. We, as our part, bind ourselves to follow your advice." Quite likely some of the doctors would be unwilling to consent to such an arrangement, as the possibilities of successful and remunerative practice in preventative medicine have not yet been demonstrated.

The nursing profession as a whole is also engaged in curative practice rather than in pre-

vention. However, when drafted into service as public health nurses, after suitable preliminary training, they have proved splendid agents for getting the new knowledge of disease across to large groups of people. In the end the wide dissemination of accurate information regarding illness, its prevention and cure can only lead to more reliance on skilled physicians and be of benefit to the medical profession as well as the entire community. There is little danger that it will lead to the dreaded "State Medicine." This in turn will increase the demand for well trained nurses. At the present time, there are about 220 registered graduate nurses in Duluth and about 17 public health nurses working for the Health Department, the Board of Education, the Insurance Companies the Steel Plant, the Masonic Fraternity, The Red Cross, etc. We need many more.

Like the curative work, disease prevention work and the public health promotion work of nurses should be conducted under medical supervision. The work of the five St. Louis County Nurses under the supervision of Dr. H. G. Lampson, whole time County Health Officer, has been of very great value in preventing epidemics in the rural districts.

Hospitals are more than ever needed in the progressive community. The development of diagnostic procedures and of special treatments available only in hospitals has increased the expense of erection and maintenance until now the modern hospital costs on an average \$4,000.00 per bed to build and \$4.00 or more per patient per day to maintain.

A city of 100,000 people should, according to the American Hospital Association estimates, have about 600 beds, or one for every 166 persons. Duluth has about 590. The average number of hospital beds in Minnesota is 340 per 100,000 and for the United States is 258.

The relation of hospitals to the community and their responsibility for follow-up work and health education is only just beginning to be realized.

New hospitals will be needed from time to time. There will be needed a community convalescent hospital where out-door rest treatment such as used for the tuberculous patient will render more effective the emergency surgery done in the general hospital, and an observation hospital or department where mental cases can



be studied before being sent to State hospitals for the insane and where borderline cases can be treated and in many instances returned to their homes as useful citizens.

Before new general hospitals are built by the community, it should be realized that a modern hospital of 100 beds costs nearly half a million dollars to build and about a quarter of a million yearly to maintain. Sources of income to meet this outlay should be in sight. The need for additional beds should be evident.

The expense of the average citizen for medical and hospital care should be provided for in wages paid and budgets made by the citizen himself. There is at present comparatively little saved for a rainy day in the average family. A case or two of tuberculosis lasting for maybe several years would bankrupt the average family if the community had no sanatorium.

Besides the medical profession, the nurses and the hospitals, a fourth and very important agency in the promotion of health is the Health Department. In a study made last summer by the Public Health Committee of the Chamber of Commerce, certain facts became clear. One of these is that careful analyses of the health work of a great many cities, including Duluth, have recently been made by competent authorities and that the results of these studies are available at the Public Library for the use of anyone who wishes to ascertain actual or recommended standards.

The report made in 1923 of an investigation of the health activities of 83 cities of more than 100,000 population by a committee of the American Public Health Association in co-operation with the United States Public Health Service includes a special section on Duluth. In 1925 another report appeared covering the activities of 86 cities of from 40,000 to 70,000 population. This was prepared by a Committee of the American Child Health Association, of which Herbert Hoover is president.

The former of these reports outlines an ideal health budget for a city of 100,000 and the latter one for a city of 50,000.

Besides these two comprehensive reports, elaborate special studies have been made of health conditions in individual cities, including Cleveland, Springfield and Louisville.

While every city has its own special problems the underlying principles brought out in all these

studies are the same. According to these reports the functions of a city health department are limited to education and preventive medicine. The cure of disease and municipal housekeeping are functions of other departments of the city government though they may happen to be administered under the supervision of the health officer. While the maintenance of hospitals and the collection of garbage have an influence on health, they are not considered primary functions of the department and its standing as regards constructive health work is not judged by expenditures for such purposes, necessary though they may be.

According to all of these reports the primary purpose of the health department is the control and prevention of disease. Whether the work done is above or below standard must be determined by an analysis of the activities strictly concerned with health conservation. These are classified under the following main divisions: Administration, Sanitation, the Control of Communicable Disease and the Conservation of Child Health. Much of the work of the modern health department is educational and comparatively little of it exercise of police power.

To assist local health officers in analyzing the health work of their own cities, the American Public Health Association, which is an organization composed largely of city health officers, has prepared an appraisal form for city health work.

Dr. L. A. Sukeforth, Director of Public Health, and Mr. M. P. Orchard, Secretary of the Department of Health, co-operated with the committee in furnishing data for the completion of such an appraisal.

The population of Duluth according to the federal census of 1920 was 98,917. The U. S. Census estimate for the current year (1926) is 113,000.

It was found that the total expenditures by the Duluth Health Department for the prevention of disease had each year since 1919 been under \$50,000.00 and that there had been practically no increase in budget as the population of the city grew from 99,000 to about 115,000. In certain important divisions, there had even been retrenchment. In the meantime, some 33 large cities were spending more per capita for health promotion through their health departments than Duluth.

As compared with the average run of cities of

approximately the same size, Duluth's per capita expenditures for health purposes, through the health department, were about the same though very much less than the budget of the Committee of the American Public Health Association.

The measures adopted for health promotion through the health department are supplemented here as in the case of other cities by the activities of various official and voluntary agencies including the Department of Education, the State Department of Health, the Sanatorium Commission, the County Public Health Association, the Masonic Fraternity, the Life Insurance Companies and the American Red Cross. The total amount expended by these agencies is estimated at \$50,000, making with the \$50,000 spent through the Health Department about \$100,000 or not quite one dollar per capita for disease prevention and health promotion.

The committee of the American Public Health Association does not consider an expenditure of two dollars per capita excessive for these purposes.

Demonstrations financed by the Metropolitan Life Insurance Company and various philanthropic foundations and sponsored by National health agencies have demonstrated that such investments in health pay. A notable example is the Framingham demonstration in Massachusetts which was continued through a period of five years with marked reduction in death rate.

While voluntary organizations will always be needed to lead the way, the major part of the work should be under the control and supervision of a progressive health department and the expense should be borne by the citizens as a whole.

The day when the work of the Health Department was largely police work and municipal housecleaning has passed. Today, in progressive communities, it consists mainly in education and should be limited to the following activities:

- Administration
- Sanitation
- Child Welfare Promotion
  - Prenatal Work
  - Infant Hygiene
  - School Hygiene
- Control of Communicable Disease
- Vital Statistics and Research

The most useful agents of the health department are not sanitary inspectors but public health nurses, and the committee of the American Public Health Association recommends the employment of thirty or more in a city of 100,000.

The committee recommended expansion of the following divisions of the Health Department work: Child Welfare, Public Health, Education, Nursing and Tuberculosis Supervision. The report is on file at the Duluth Public Library.

It is suggested that organizations vitally interested in the health of the community which should stand behind the Health Department and be ready to furnish intelligent counsel as well as powerful influence on public opinion include the Duluth Council of Social Agencies, the Taxpayers League, the St. Louis County Medical Society, the St. Louis County Public Health Association and the Duluth Chamber of Commerce.

The City of Duluth should not decide to establish or maintain additional hospitals for the cure of disease without careful study of the need of expenditures for the prevention of disease and the promotion of health.

The plan recently suggested and approved by the Public Health Committee of the Chamber of Commerce for co-operation between the governing bodies of the City Contagious Hospital, the proposed Miller Hospital and the County Hospital is worthy of careful consideration if it becomes apparent that additional hospital facilities are needed.

In conclusion, the Duluth Council of Social Agencies should go on record as asking for repeated checking up of the work of the Health Department by the new standards available which, based on studies of the health activities of 169 cities, should aid and support the health authorities of the city in the preparation of an adequate budget to secure the full financial and health benefit which may be derived from health promotion methods of demonstrated value.

Concerted studies and action by the Health Department, the County Medical Association, the County Public Health Association, the Chamber of Commerce and the Council of Social Agencies and the Taxpayers League would crystallize public opinion in favor of definite measures for which there are abundant precedents and standards.

OPHTHALMOSCOPIC EVIDENCE OF  
GENERAL CIRCULATORY  
DISEASE\*

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The ophthalmoscopic evidence of circulatory and renal disease is appreciated only as we learn to properly interpret the significance of the various changes found. The ophthalmoscopist associates certain fundus changes with definite general diseases—hyperpiesis, arteriosclerosis, nephritis, diabetes, hemic conditions, syphilis, or some general or focal toxic infection. They indicate to him the necessity of exhaustive physical examination of the circulatory system and eliminative organs, or search for possible sources of toxemia. The changes fall into two main groups: (1) those which have to do almost entirely with the circulatory system, and (2) those which are manifestations of toxemia. Often one produces the other, or the same causes produce both, but the predominance of the toxic or the circulatory factor, or the order of sequence in their development, may be of the utmost clinical significance. The changes found may be too complex, of themselves, to permit exact analysis of their origin, and only occasionally may an arbitrary diagnosis be made from fundus changes alone. Practically all visible retinal pathology results from causes which manifest themselves through vascular changes. The evidence available to the internist with the retinal vessels visible under magnification of about fifteen diameters makes the ophthalmoscopic findings of especial value in patients with cardiovascular renal syndrome. Cohen<sup>1</sup> proved that choroidal vessels share in vascular changes and may undergo even greater degree of angiosclerosis than the retinal vessels but, obviously, the evidence of choroïdo-vascular disease is less frequently visible. The most frequent changes met with in fundus examinations have to do with hyperpiesis and arteriosclerosis.

The study of retinal evidence of hypertension has followed the routine measurement of blood pressure as a part of physical examination but the first published case showing ophthalmoscopic evidence of hypertension was in 1892 by Marcus

Gunn,<sup>2</sup> before the use of instruments for recording blood pressure. Although thirty-three years have added much to his observations, in the main we must adhere to his description, which was as follows: "The arteries have an exceptionally bright reflex. The central light streak is very distinct and sharp, producing a metallic appearance like bright copper wire. This condition has been observed in chronic albuminuria and in several cases where no albumin is found, or where high tension suggested the probability of changes in the arteries, usually associated with those of chronic renal disease. The ophthalmoscopic appearance is presumably due to hyalin degeneration of the arterial wall. Attention is directed to the effect produced on the veins by arteries overlying them. Where an artery, even a small twig, passes over a retinal vein, the circulation in the latter is much impaired. In some cases the vein is indistinguishable just at the spot where it is crossed and is evidently distended for some distance peripherally from this point. The appearance is interpreted as evidence of high arterial tension." In addition to the foregoing, the picture may show evidences of toxemia, namely, cotton-wool exudates or edema of the nerve-head and neighboring retina.

In simple high blood pressure independent of other retinal evidences of toxemia or angiosclerosis, there are certain cardinal signs. The first of these is a marked increase in prominence and breadth of the arterial light reflexes, with elongation and tortuosity of the retinal vessels, especially the smallest terminals and macular twigs. Later the vessel wall becomes thickened from endoarterial proliferation and increase in the medial coat, and the arteries appear uniformly contracted, of lessened caliber, the reflex arterial light stripe is narrowed, the veins are congested, and about double the normal size. The outstanding phenomenon is the apparent interruption in the venous circulation where the veins are overlaid by arteries at points of crossing, in the manner described by Gunn. It is now generally accepted that the hyperpiesia is arteriolar in its origin.

If, with high blood pressure, there is marked arteriosclerosis, certain further changes are evident which have very decided diagnostic and prognostic value. When high blood pressure is

\*Read before the Minnesota Academy of Medicine, May 13, 1925. From the Miller Clinic, St. Paul.

followed by, or follows, marked angiosclerosis, the type of the arterio-venous crossings, as pointed out by Mr. Foster Moore,<sup>3</sup> differs from the type found in hyperpiesis. Where an artery crosses a vein, it does so by the shortest possible route and one sees a so-called "right-angle crossing," with an appearance of actual interruption in its course. "The vein, though meeting the artery normally at about an angle of, say, 30 degrees, and leaving it at a similar angle, passes under it at right angles to its course." "A similar phenomenon may be seen when a vein crosses over a sclerosed artery." This is illustrated in Plate I where the artery and vein cross. This phenomenon is attributed not only to the tightness of the vessel and its translucency, from hyaline or fibrous thickening in its wall, but also to direct mechanical effect of pressure of the sclerosed artery upon the thinner walled vein. It constitutes the most constant evidence of arteriosclerosis with hypertension. In addition one commonly observes the smaller terminal vessels surrounding the macula and near the disc having a decidedly corkscrew appearance indicative of hypertension and venous stasis.

One frequently sees marked evidence of arteriosclerosis without hypertension. The outstanding characteristic of advanced arteriosclerosis is the irregularity in caliber of the arteries. Not only is the caliber of all arteries often apparently uniformly decreased, giving rise to the appearance of contraction, but in places one frequently sees them very uneven and patchy and presenting a beaded appearance; or more commonly the narrowing of the lumen is gradual, again becomes normal, and further along the course of the vessel shows the same phenomenon repeated. In extreme cases the lumen may become completely obliterated in places as a result of subendothelial proliferation. Such changes are indicative of quite advanced arterial change. At other times, especially in syphilis, a perivasculitis occurs, with marked evidence of thickening of the adventitia. In such cases, there is a sheath of connective tissue enveloping the arteries for some distance from the disc, after which the arteries appear to be narrowed. At other times, the vessel shows a type of "pipestem sheathing." Personal observations of arteriosclerosis in senile patients confirms the statement of Wagener<sup>4</sup> and others that irregu-

larities in caliber are sometimes less prominent in the aged. The explanation for this is probably due to the fact that senile vascular sclerosis occurs principally in the elastic coat and that changes in the middle coat are more uniform in senile atheromatous or sclerosing types; also the light reflex phenomenon is rarely so prominent unless accompanied by hypertension.

Mr. Foster Moore<sup>5</sup> first described the type of angiosclerotic retinitis which is distinct from that seen in connection with renal disease. When present it is to be accepted as evidence of vascular changes of long standing. He emphasizes the distinction between this type of retinitis and that which characterizes renal disease. It is much more frequent when hypertension accompanies angiosclerosis, and is characterized by bright white spots or dots in the retina, seldom of greater diameter than the veins, with no exudate around them. Their favorite site is along the main vessels near the nerve-head, in and around the macula, or between the macula and the nerve. These spots are sharp-edged, round or oval, seldom distinct, and probably represent degenerative or nutritional changes in or near the lamina vitrea, very small patches of localized exudate, or hemorrhage in the superficial choroid or deep retinal layers. These spots may entirely disappear and new ones form. The presence of marked arteriosclerotic retinitis is of prognostic value both as to the association with cerebral vascular lesions and duration of life. Occasionally, stellate formations around the macula or a fan-shaped figure between the disc and macula may be observed. These spots are distinctly different from the toxic changes, white wool patches or so-called snow-bank exudates, noted in renal retinitis. Stellate figures represent a sequence of macular edema and are considered by most ophthalmoscopists as evidence of interstitial nephritis, but they occur with syphilis and not infrequently with venous thrombosis and even choked disc. According to Cushing and Bardley<sup>6</sup>: "Undoubtedly, so-called albuminuric retinitis is, in large part, a local edema of mechanical origin." Uremia produces increased intracranial pressure and pressure in the nerve sheath. Indirectly, mechanical stasis contributes to the blood toxin factor in producing the retinal manifestations of toxemia, and it must ever be borne in mind that urea nitrogen is not



Age 47. Chief complaint, headaches. B.P. 190/120 to 235/140. Urinalysis: trace of albumin, a few hyaline casts. Blood chemistry normal. Wassermann, negative. Fundus shows hyperemia of disc with new-formed blood vessels on the disc. Arteries show prominent light streaks, variations in caliber, both arteries and veins with corkscrew terminals. Typical arteriovenous crossings. A few scattered petechial hemorrhages and exudates. Diagnosis: Essential hypertension. Subsequent history: stroke three years later; death five years later from cardiac and renal complications.



Plate I



Plate II

Blood pressure was 215/130 at the time this drawing was made. Neither albuminuria nor urea nitrogen retention were prominent symptoms. The ophthalmoscopic evidences of toxemia predominate although moderate hypertension and arteriosclerotic changes are present. This case was diagnosed malignant hypertension by several very good internists.

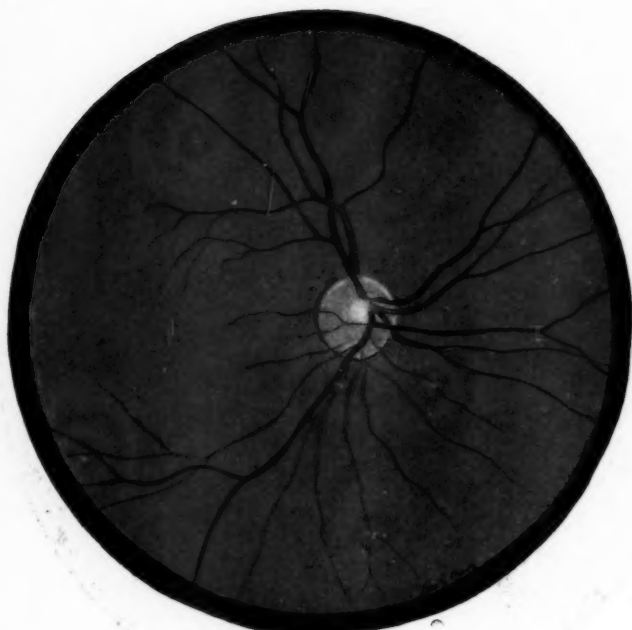


Plate III

*J. S., aged 50. Fundus shows narrowing of all inferior branch arteries with loss of field of vision over corresponding area. Diagnosis: Obliterating arterial thrombosis following angiospasm.*

*P. T. J., aged 70. Sudden loss of vision Nov. 14, 1924. Cardiac hypertrophy. B.P. 251/110. Urine repeatedly negative. Moderate evidence of general arteriosclerosis. Fundus shows exaggerated light streaks on most of the arteries and to a lesser degree along the veins also. Marked variation in caliber of superior nasal vein. Complete obstructive thrombosis of superior temporal vein beyond point of crossing over sclerosed artery at disc margin, resulting in stasis and extensive hemorrhage beyond thrombosis. Scattered "white spots" of arteriosclerotic retinitis. Diagnosis: Hypertension and arteriosclerosis, thrombosis of superior temporal retinal vein.*

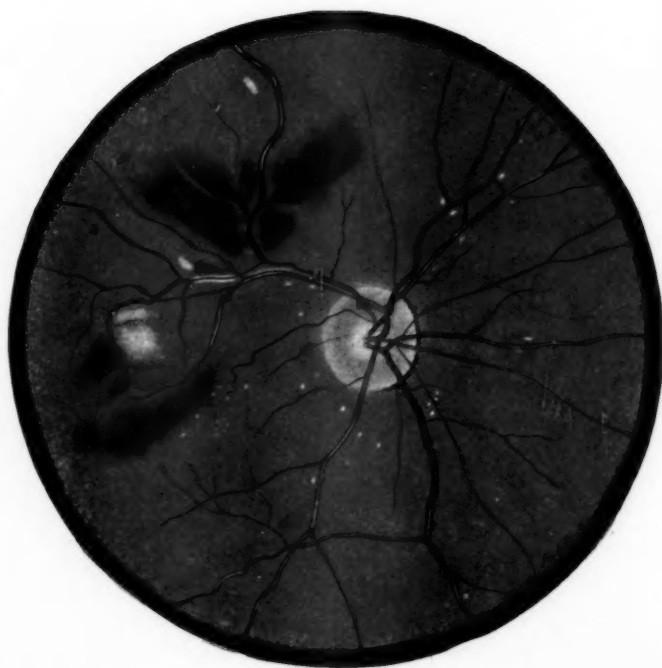


Plate IV

the only factor, and not necessarily the principal blood toxin, producing the changes we find. Other toxins, many hemic conditions, and products of perverted metabolism, may be very important causes. Nevertheless, when seen with hypertension and arteriosclerosis, with scant albumin or a few casts, we may assume we are dealing with a process in the kidney essentially of the sclerosing type, the so-called arteriosclerotic kidney, although these patients may survive many years after retinal changes are found, and die quite frequently of cardiac or cerebral complications and not with uremia.

"Malignant hypertension" is now receiving special consideration as a clinical entity in which characteristic retinal changes are fairly uniform. The disease is characterized by high diastolic pressure, without very definite renal insufficiency; there is cardiac hypertrophy with peripheral sclerosis; anemia is not marked and the kidney changes are not accompanied by albuminuria until late. One does not get laboratory reports of marked urea nitrogen retention in the blood. The disease usually terminates with cerebral or cardiac complications rather than in uremic coma. According to my observations the retinitis of malignant hypertension quite uniformly presents the appearance of advanced arteriosclerosis and hypertension, combined with toxic neuroretinitis resembling that seen with toxemia of pregnancy, although the edema exudates, hemorrhages and stellate macular changes are less pronounced during early stages. The retinitis always accompanying malignant hypertension is an important part of the clinical picture, and, in conjunction with the clinical and laboratory evidences manifest, forms an important link in diagnosis. It is well illustrated in Plate 2 from a patient who complained of slight visual impairment. The retinal evidences as shown by variation in arterial caliber, interrupted arterio-venous crossings, with areas of increased arterial light reflex, localized edema of the retina, a few exudates and hemorrhages, with optic neuritis, may be accepted as evidences of malignant hypertension, when considered with laboratory reports and physical evidences mentioned above.

Retinal hemorrhage in purely sclerotic changes represents evidence of stasis and hypertension plus degenerative changes in the vessel walls, permitting diapedesis. One does not frequently

see hemorrhage in essential hypertension, without evidence of arterial degeneration. Likewise, in senile angiosclerosis without hypertension, hemorrhage is comparatively rare. Most frequently the combination of arteriosclerosis with increased intravascular tension or venous stasis results in hemorrhages. These are commonly small, flame-shaped, and limited to the nerve fiber layer of the retina. Less frequently they are circular, petechial in type, pale in appear-

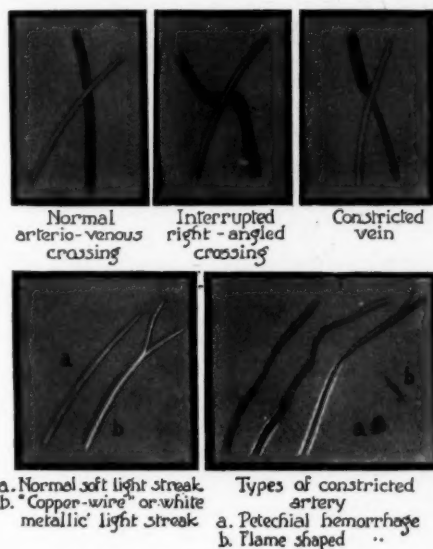


Plate V

*Showing typical changes in the retinal blood vessels in arteriosclerosis and hypertension.*

ance, usually near the large vessels, representing extravasation into the granular layers. They may be absorbed and leave no trace, or be followed by patches of atrophy when absorbed, or occasionally some pigment disturbance follows. Occasionally, a slight trauma may be the immediate cause of extensive hemorrhage. Subhyaloid extravasations over a very extensive area frequently follow comparatively insignificant injuries, usually have their site at the macula, often becoming absorbed without leaving a trace, or with very little pigment disturbance.

One occasionally finds an unusual condition of marked tortuosity of the retinal veins, extending even to the smaller branches. In contrast to the tortuosity of the veins is the exceeding straightness of the arteries. The condition indicates

venous stasis, either from local causes in the orbit or from general causes, or the condition may be purely mechanical from anatomical or orbital pressure, the physical findings revealing no general systemic or organic disease. In patients with patent foramen ovale or pulmonary stenosis, one frequently sees a cyanotic fundus with markedly dilated and tortuous retinal vessels, especially the veins. The retinal arteries are much darker than normal and somewhat resemble the veins in color. A similar condition occurs in erythremia, although in this condition the arteries are not much affected. In severe cases the veins are extremely cyanotic and tortuous, the cyanosis probably due to insufficient oxidation as well as stasis. In marked aortic regurgitation distinct pulsation of arteries is commonly observed.

All evidences of circulatory disease are not manifested by hyperplastic or degenerative changes in the vessels. Not uncommonly a patient in middle life presents himself for examination with a history of sudden blindness caused by embolism of the central retinal artery. Ophthalmoscopically, one finds a complete obstruction of the central retinal artery, or one of its branches, evidenced by great reduction in the size of the vessels, usually a localized edema of the macula and a marked retinal anemia. The arteries may appear reduced to mere threads and the smaller ones invisible. Usually, the nerve atrophies and blindness is permanent unless immediate restoration of the circulation is established. The case may be one of mitral disease, the blindness caused by separation of detached valvular vegetation finding lodgment in the retinal artery. Most cases diagnosed as embolism of the retinal artery are really due to thrombus formation in which the lumen of the vessel, already narrowed from proliferation of its endothelium, has become suddenly occluded. It should be borne in mind that a single branch artery may frequently show ophthalmoscopic evidence of obliterating endarteritis. (The reader is referred to textbook illustrations of "Embolism of the central retinal artery.").

A more unusual affair is illustrated in the following case with obstruction to retinal circulation, undoubtedly caused by angiospasm of the vessels with arteriosclerosis and later hypertension.

F. S., aged 50, came February 27, 1918, for refraction. His vision was normal with corrected refraction and the fundi were normal. September 18, 1924, he had a peculiar attack of blindness in the right eye which lasted three or four minutes, and other attacks of dimness of vision for periods of several minutes, affecting the right eye only, during the succeeding days. On September 24, 1924, when I saw him, nothing abnormal was found on ophthalmoscopic examination excepting the right inferior temporal vein was much larger than any of the others.

It was then suspected that he must have had retinal amaurosis, probably due to angiospasm. He was referred to Dr. E. M. Hammes, his physician, who reported that he had myocarditis, blood pressure 108, urine normal. Otherwise, exhaustive physical examination revealed nothing. On December 18, 1924, he returned. Vision was 20/30. He had had an attack of blindness in the right eye, lasting about an hour, from which he only partially recovered. Since that time he has seen only the lower half of objects with the right eye. Perimetric examination of the visual fields showed altitudinal hemionopsia in the right eye. Ophthalmoscopic examination showed a definite narrowing of the lumen of the entire inferior branch of the retinal artery. The vein apparently lies over the artery and was not now abnormally dilated as was noted four years before. The inferior artery is less than one-fourth normal caliber, the light streaks entirely absent; the terminal vessels seem all but obliterated toward the periphery. There are two interrupted crossings where the superior temporal artery and vein cross and at the inferior arterio-venous first crossing. No hemorrhages or exudates were visible. Examination of the left eye showed practically the same type of crossings, no other marked evidence of arteriosclerosis being present.

Further report by Dr. E. M. Hammes on December 29, 1924, follows:

Family and personal history negative. His present difficulty dates back two years when he began to have left occipital headaches of an intermittent type, associated with nausea and vertigo. During the past eight months he has fatigued easily, has had periods of dizziness and staggering and more headaches than usual, always left-sided and migrainous in type. Examination showed no physical or organic defect other than a well compensated mitral regurgitation. Blood pressure 160/90, urine negative, blood and spinal fluid normal, Wassermann negative. Neurological examination entirely negative.

This case (Plate 3) is diagnosed as one of arteriosclerosis and angiospasm with obliterating endarteritis of the inferior retinal arterial branch, caused by angiospasm. This latter diagnosis is based upon the history of temporary blindness four years previously, with ultimate loss of the upper field of vision from closure of



the arterial lumen. It is difficult to believe an embolism would be likely to affect the same artery many times.

Thrombosis of the central retinal vein or of one of its branches is not very infrequent and almost invariably caused by pressure of a sclerosed and thickened artery upon the vein. This may occur either where the vein enters the optic disc or where a branch vein is crossed by an artery. The thrombus produces venous stasis resulting in extensive hemorrhage which may completely obscure the nerve-head, leading to confusion with monolateral choked disc, when the central vein is compressed. In the case of involvement of a venous branch, most frequently the right superior temporal, the resulting hemorrhagic extravasation is localized around the particular branch involved (Plate 4). Newly formed blood vessels may reestablish circulation around venous obstruction of a branch vessel and vision may not be too seriously damaged, but acute glaucoma is a possible complication of every thrombus of the central vein, disastrous in its damage to vision if not to the eyeball itself. Only once have I met with thrombosis in both eyes, with an eight year interval before involvement of the second eye. Glaucoma produced blindness in both eyes. The prognosis in these cases is frequently better than one would expect, many cases living for ten or fifteen years. The majority die of cerebral apoplexy.

From the prognostic standpoint the ophthalmoscope reveals distinct evidence bearing upon the type and stage of circulatory disease. In connection with retinal angiosclerosis as an index of the condition of the cerebral vessels, Knapp<sup>7</sup> states that marked changes in the retinal vessels indicate a similar state in the cerebral vessels, but not the reverse. Moore,<sup>8</sup> in a series of sixty-six patients, found that 44 per cent developed cerebral hemorrhage or thrombosis, hemiplegia or monoplegia, within seven years of the period when marked evidence of retinal sclerosis and hypertension was first noted. Likewise, in a series of cases admitted to the St. Bartholomew's Hospital with cerebral lesions of vascular origin, retinal evidence of angiosclerosis was present in 70 per cent of them. In the absence of albuminuria especially, the retinal vessels present a fairly good index of the state of the cerebral vessels in patients past middle life.

It is necessary to emphasize the essentially different type of changes seen in arteriosclerosis and hypertension from those which distinctly characterize renal retinitis. In albuminuric or renal retinitis, the characteristic evidences of break in renal function are edema of the nerve-head, or edema in the retina around the disc or macula, with soft woolly patches and hemorrhages which are often diffuse, or border the patches of exudate. When albumin and casts are present, it usually represents parenchymatous nephritis.

The ophthalmoscopic picture is very frequently a most complicated one with all the signs of toxemia superadded to those of angiosclerosis plus hypertension. No single feature or change found with the ophthalmoscope has great diagnostic value considered *alone*. When several signs are present, and considered with the other physical findings, they contribute information of value, both in diagnosis and prognosis. When evidence of beginning retinal angiosclerosis is present in a person in middle life, especially also if the evidence of increased intravascular tension is marked, we may be able to seek for causative factors and remove them at a time when preventive measures may do some good. It is not always possible to diagnose types of cardiac or renal disease, syphilis, or intracranial lesions by fundus examination alone, without the aid of the internist, the neurologist and the laboratory, but the ophthalmoscope very frequently affords information of value in estimating the extent to which the disease has progressed. For this reason, it is of utmost importance that we be able to recognize, properly interpret and evaluate the vascular changes visible with the ophthalmoscope.

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The writer is indebted to Miss Jean Hirsch of the medical art department of the University of Minnesota and to Mrs. Hal McWethy of Saint Paul for drawing the fundus pictures illustrating this article.

## NEW AND NON-OFFICIAL REMEDIES

The following article has been accepted by the Council of Pharmacy and Chemistry

H. K. MULFORD Co.

Antivenin (Nearctic Crotalidæ)-Mulford.

### TRUTH ABOUT MEDICINES

**Neonal**—*N*-Butylethylbarbituric acid.—Neonal differs from barbital (diethylbarbituric acid) in that one of the ethyl groups of the former is replaced by a normal butyl group. The actions and uses of neonal are essentially similar to those of barbital, but it is about three times as active as the latter; hence it is used in correspondingly smaller doses. It is claimed that it exerts a sedative action to an exceptional degree, and that it is useful therefore in high nervous tension, neuroses and other conditions in which a sedative is required. Neonal is supplied in powder and in 0.1 Gm. tablets. Abbott Laboratories, North Chicago, Ill. (Jour. A. M. A., June 4, 1927, p. 1802.)

**Pollen Extracts-Cutter.**—These are now marketed in capillary tubes and in packages consisting of three vials representing graduated concentrations. In addition to the products listed in New and Non-official Remedies, 1927, p. 34, the following have been accepted: Alkali Weed Pollen Extract-Cutter; All Scale Pollen Extract-Cutter; Box Elder Pollen Extract-Cutter; Burning Bush Pollen Extract-Cutter; Corn Pollen Extract-Cutter; Foxtail Pollen Extract-Cutter; Mountain Cedar Pollen Extract-Cutter; Tumbleweed Pollen Extract-Cutter; Western Water Hemp Pollen Extract-Cutter. Cutter Laboratory, Berkeley, Calif.

**Pollen Extracts (Glycero-Saline)-Mulford.**—Liquids obtained by extracting the dried pollen of plants with a liquid consisting of 66 2/3 per cent of glycerin and 33 1/3 per cent of saturated sodium chloride solution. For a discussion of the actions and uses see Allergic Protein Preparations (New and Non-official Remedies, 1927, p. 23). Pollen extracts (glycero-saline)-Mulford are marketed in bulk treatment packages and in treatment sets consisting of: First series (doses 1 to 5, inclusive); second series (doses 6 to 10, inclusive); third series (doses 11 to 15, inclusive); complete series

(doses 1 to 15, inclusive); fourth series (doses 16 to 20, inclusive). The following preparations have been accepted: Lamb's Quarters Pollen Extract (Glycero-Saline)-Mulford; Ragweed Pollen Extract (Glycero-Saline)-Mulford; Timothy Pollen Extract (Glycero-Saline)-Mulford; Wormwood Pollen Extract (Glycero-Saline)-Mulford. H. K. Mulford Co., Philadelphia. (Jour. A. M. A., June 11, 1927, p. 1891.)

**Ethylene-C. L. P.**—A brand of ethylene for anesthesia—N. N. R. For a discussion of the actions and uses see New and Non-official Remedies, 1927, p. 50. Certified Laboratory Products, Glendale, Calif.

**Protein Extracts Diagnostic-P. D. & Co.**—In addition to the products listed in New and Non-official Remedies, 1927, p. 40, the following have been accepted: Alfalfa Pollen Protein Extract Diagnostic-P. D. & Co.; Bean (Kidney) Protein Extract Diagnostic-P. D. & Co. Parke, Davis & Co., Detroit.

**Typhoid Vaccine (Prophylactic) (New and Non-official Remedies 1927, p. 369).**—This product is also marketed in packages of one 20 c.c. vial containing 1,000 million killed typhoid bacilli per c.c. Parke, Davis & Co., Detroit.

**Typhoid-Paratyphoid Vaccine (Prophylactic) (New and Non-official Remedies, 1927, p. 369).**—This product is also marketed in packages of one 20 c.c. vial containing 1,000 million killed typhoid bacilli and 750 million each of killed paratyphoid bacilli A and B per c.c. Parke, Davis & Co., Detroit.

**Horlick's Maltose-Dextrin Milk Modifier.**—A mixture containing approximately: maltose, 63 per cent; dextrin, 19.5 per cent; protein, 11.5 per cent; fat, 1.4 per cent; moisture, 2 per cent; and ash, 2.6 per cent. On the claim that maltose is more readily assimilable than other forms of sugar, this product is proposed to supplement the carbohydrate of cow's milk. Horlick's Malted Milk Corporation, Racine, Wis. (Jour. A. M. A., June 18, 1927, p. 1967.)

**B. Acidophilus Milk-Fairchild.**—A whole milk cultured with *B. acidophilus*. It contains not less than 50 millions of viable organisms (*B. acidophilus*) per c.c. at the time of sale. For a discussion of the actions and uses of bacillus acidophilus preparations, see New and Non-official Remedies, 1927, p. 216, "Lactic Acid-Producing Organisms and Preparations." Fairchild Bros. & Foster, New York. (Jour. A. M. A., June 25, 1927, p. 2035.)

# MINNESOTA MEDICINE

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## EDITORIAL

### The State Meeting

Another milestone in the history of our State Association was passed at the Duluth meeting. Interest in state medical activities was manifest by the registration of 517 members, fully a quarter of the state membership.

The outstanding achievement of the year was the success of the legislative committee in passing the Basic Science bill and also a new Medical Practice law. Due appreciation of the work of this committee was expressed at the various sessions.

The dispatch with which the business of the House of Delegates was carried out was largely due to the improvement in the manner of handling Association matters. Needless discussion

of resolutions proposed by various committees and delegations was reduced to a minimum by reference to a resolutions committee whose recommendations were for the most part promptly adopted by the House of Delegates.

Among the messages brought by our distinguished guests that presented by Dr. Harris of Chicago was from the standpoint of medical economics most interesting. It is safe to state that the great majority of physicians believe in the fundamental right of an individual to choose his own medical adviser even in workman's compensation cases. As the law is operated in our State the employer or insurance company selects the attending surgeon. Dr. Harris informed us that in Chicago at least the employer is bound to pay a reasonable fee to the family doctor although the company has a right to have its own doctor investigate the case. A legal decision has been reached on this point in Illinois. There are arguments, of course, on both sides of the question as to who should choose the attending doctor, but the right of the individual to make the choice seems fundamental. It is to be hoped that the committee on contract practice which is to be continued next year will have a satisfactory remedy for the unjust situation that exists at present in Minnesota.

The entire proceedings of the House of Delegates will appear later in the journal for the benefit of the members who were not able to attend the Duluth meeting. Only the briefest mention can be made here of the business transacted. Provision was made for honorary membership in the Association upon recommendation of the Council and election by the House of Delegates. It was decided to allow A. M. A. delegates traveling expenses and a set amount per diem after 1928. Among the various new committees to be appointed are: One to act in an advisory capacity to confer with the United States Army in matters of medical personnel; one to confer with the Minnesota State Health Association; one to cooperate with the State Department of Health in a study of maternal deaths, and one to be known as a committee on university relations.

Since the establishment of the journal the handling of the finances of the publication has been most cumbersome. In the future the busi-

ness manager of the journal will handle the financial affairs of the journal separately and make quarterly reports to the Association. Delay and duplication of work will thus be avoided.

Next year we will meet in Minneapolis in conjunction with the American Medical Association. The actual meeting will be limited to the convening of the House of Delegates and no scientific papers will be presented. It was felt that the usual program either in conjunction with the A. M. A. meeting or at a different date would not be advisable. It is to be hoped there will be no falling off in the publication of valuable work being done throughout the state because of this arrangement.

The following officers for 1928 were elected:

President, Dr. Charles B. Wright, Minneapolis

First Vice President, Dr. Charles Bolsta, Ortonville

Second Vice President, Dr. A. G. Liedloff, Mankato

Secretary, Dr. E. A. Meyerding, St. Paul

Treasurer, Dr. Earle R. Hare, Minneapolis.

The councillors re-elected were:

Fourth District, Dr. F. A. Dodge, Le Sueur

Sixth District, Dr. W. H. Condit, Minneapolis

Seventh District, Dr. W. W. Will, Bertha

Eighth District, Dr. G. S. Wattam, Warren

Dr. J. C. Litzenberg of Minneapolis was elected A. M. A. delegate with Dr. W. F. Braasch of Rochester as alternate.

### Free Clinics

The medical needs of the poor in the larger communities are provided free by municipal or privately supported organizations. Such organizations facilitate the rendering of much charity work by the profession which from a humanitarian standpoint is absolutely necessary. On the other hand we know of no other profession that gives free service to the poor of a community in any way commensurate with our profession. Certain individuals and business concerns, it is true, contribute, often generously, to philanthropic and social agencies devoted to the relief of the poor and this fact should not be lost sight of when we, as it were, pat ourselves on the back.

From time to time organizations dispensing

medical aid in an effort to expand their work, educate the public or increase their income, adopt policies which are distinct impositions on the good nature of the medical profession. It behooves the profession to oppose such extensions, which too often lead in the direction of socialized medicine.

Recently the Chicago Medical Society took the stand that they would render free medical services only to individuals who were recipients of any other form of charity. Whether medical charity can be limited in this way remains to be seen.

Committees of the Hennepin and Ramsey County societies have investigated local conditions and the societies in adopting their reports take much the same viewpoint on the questions involved. The Ramsey County members express the opinion that free medical services should be given to the poor only and declared themselves opposed to any part pay plan for a hospital or clinic where physicians contribute their services for nothing.

The stumbling block in the carrying out of any recommendations so far proposed is the fact that each individual case must be accepted or rejected at a free clinic on its own merits. No arbitrary standards are possible. This gives considerable leeway to the social service staff of any free clinic and opportunity for imposing on medical charity. It does seem that in clinics run essentially for dispensing medical service the doctors should have a voice as to who shall be given the charity.

Announcement was recently made that the Ancker hospital in St. Paul was contemplating making a charge for hospital services commensurate with ability to pay. This would be following in the footsteps of the University hospital and the Minneapolis General hospital. It seems quite obvious that such a system can very easily extend the scope of free medical service even with most rigid investigation of the financial status of patients applying for treatment. In actual practice this has been the result, the nominal charge not being sufficient to divert the patient back to a private hospital and physician.

Only further confusion can result from the institution of partial payment of medical expenses in charity clinics. Charity and private practice should stay divorced, in our opinion.



## MISCELLANEOUS

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For the information of Association members the following sections of the Minnesota Laws Defining and Regulating the Practice of Healing as enacted in 1927 are herewith reproduced:

*Section 8.* Any person not hereinafter excepted from the provisions of this Act who was lawfully authorized to practice healing, as by this Act defined, in this state on the date this Act takes effect, and who was on that date regularly licensed or registered in the manner then by law provided, shall, upon application as herein provided, receive from the State Board of Examiners in the Basic Sciences a certificate of registration in the Basic Sciences without examination therein; provided, however, that on or before October 1, 1927, every such person shall apply to the secretary of said Board for such certificate or registration, accompanying such application with *sufficient and satisfactory evidence that he was*, on the date of the passage of this Act, lawfully authorized to practice healing or regularly licensed or registered according to law in the particular branch or system of healing by him pursued and specifying in said application the branch or system of healing pursued by the applicant, the school from which he graduated, if any, and the date of graduation from said school together with a fee of three dollars. Such certificate of registration shall recite that registration is made solely as a person lawfully authorized to practice healing or licensed or registered according to law on the date this Act takes effect, and that same was issued without examination in the Basic Sciences. Any person entitled to a certificate of registration in the Basic Sciences without examination therein pursuant to the provisions of this

section who fails to apply for same in the manner herein provided shall not receive such certificate of registration except upon an application for examination and actual examination in the Basic Sciences as hereinbefore provided; provided, however, said State Board of Examiners in the Basic Sciences may after the first day of October, 1927, in its discretion upon payment to it of a fee of \$25.00, issue a certificate of registration in the Basic Sciences without examination to any person who would have been entitled thereto pursuant to the provisions of this section upon applying therefor on or before the first day of October, 1927, and who makes application therefor in the manner herein provided and shows good cause why said application was not made on or before the first day of October, 1927.

*Section 10.* Every person holding a certificate of registration under this Act shall have it recorded within 30 days after the issuance thereof in the office of the Clerk of the District Court of the county in which he resides, and whenever he shall change his place of residence to another county, he shall again record such certificate in the office of the clerk of the District Court of such county, and the clerk shall, in each case, write or stamp thereon the date of such recording. The clerk of the District Court shall keep in a book provided for such purpose by the county and open to the public inspection a complete list of such certificates of registration in the Basic Sciences recorded by him and his predecessors in office, including the date of the issue of each certificate of registration, the name of the person therein and the date of the recording thereof. For each such recording the clerk of the District Court shall receive from the person named in the certificate of registration a fee of One Dollar. After such recording the certificate of registration shall be conspicuously displayed by the holder thereof in the office or place where he pursues the practice of healing.

*Section 13.* Every person not hereinafter excepted from the provisions of this act authorized to practice healing in this state shall in the month of January of each year register with the secretary of the particular Board of Examiners which examined and registered or licensed him to practice that branch or system of healing which he pursues; and shall at said time for the purpose of making such registration send to such secretary in writing signed by him, his name, the name of the place and the address at which he is engaged in the practice of healing, and pay to said secretary respectively for the years 1928 and 1929, a fee of \$5.00, and thereafter for each year a fee of \$2.00. Any person who shall change the address or place at which he practices healing during the year shall forthwith notify such secretary in writing of such change, giving such new address or place. The secretary of each Board of Examiners shall keep a proper register of all such persons and to each person so registering the proper board shall issue a certificate for the current year, signed by the president and secretary and sealed with the seal of such board, setting forth his name, the name of the place and the address at which he is engaged in the practice of healing, and the branch or

system of healing by him pursued. Any person not hereinafter excepted from the provisions of this act lawfully entitled to engage in the practice of healing in this state after the month of January in any year and who shall not be registered as provided in this Section, shall, within thirty days after first so engaging in the practice of healing, register with the proper examining board in the manner herein provided and pay to the secretary of such board the fee above required, and shall receive from such board a certificate as above prescribed for the balance of such year. Every person receiving a certificate as herein provided shall display the same in a conspicuous place in the office or other corresponding place where he pursues the practice of healing. All fees received by the secretary of any examining board for registration required by this section shall be available to and may be used by such board to defray the expenses of keeping proper registers, furnishing the certificates herein provided for, employing an inspector or inspectors for procuring evidence of any violation of the law or laws administered thereby and aiding in the enforcement of such law or laws and for such other expenses as may be necessarily paid or incurred in the exercise of its powers or performance of its duties as provided by law.

**Section 17.** Any person not hereinbefore excepted from the provisions of this Act who shall after October 1, 1927, practice or attempt to practice healing as in this Act defined in the State of Minnesota without a valid existing certificate of registration in the Basic Sciences issued to him pursuant to the provisions of this Act, shall be guilty of a gross misdemeanor.

**Section 18.** Any person not hereinbefore excepted from the provisions of this Act who shall practice healing or attempt to practice healing in this state without having recorded his certificate of registration in the Basic Sciences in the manner herein provided, or without having registered with the examining board in the system or branch of healing by him pursued as herein provided, or without displaying his certificate of registration in the Basic Sciences and his certificate of annual registration with the proper board of examiners as herein provided, shall be guilty of a misdemeanor.

The registration with the Board of Medical Examiners will not take place until January, 1928, sometime during which month physicians must register after having registered with the Basic Science Board. Physicians should therefore first register with the Basic Science Board. In the near future registration forms will be mailed to all Minnesota physicians whose names appear in the last A. M. A. directory. If a physician does not receive such a form in the near future he is not excused from the penalty for not registering. Therefore, if you do not receive this form, apply for a form from Dr. E. T. Bell, Secretary of the Basic Science Board, 110 Anatomy Building, University of Minnesota, Minneapolis. You must apply for the Certificate of Registration on or before Oct. 1, 1927. Within thirty days following the receipt of the Certificate of Registration this must be record-

ed in the office of the Clerk of District Court of your county.

## PRELIMINARY REPORT ON WASSERMANN REACTIONS

C. C. VAN WINKLE, M.D.  
Minneapolis

Not long ago a striking statement was encountered by Dr. Mariette in an analysis of Wassermann reactions among tuberculous patients to the effect that 31 per cent of non-syphilitic tuberculous patients gave a partial or complete fixation. This seemed a higher percentage than was his impression in going over his charts. So we set out to determine the incidence of these reactions among the patients at the Glen Lake Sanatorium.

A very brief review of the literature brought out some conflicting reports. It was Snow and Cooper, in 1916, who reported 31 per cent of partial and complete fixation when using a cholesterinized antigen. These cases were negative when an alcoholic antigen was used. J. S. Ford (1917) reports irregular fixation with cholesterin antigen but in only 5 per cent of such cases.

Lately, considerable work has been done using the Kolmer test, which gives a higher percentage of agreement with clinical findings with fewer false positives or negatives. The Kolmer antigen is a slightly cholesterinized one.

In a paper comparing the results on 5,000 sera when using the Kolmer antigen and an alcoholic human heart antigen, Irvine and Stern (1923) found 3 per cent double reactions with each antigen. But there was a closer clinical agreement with the Kolmer test. We can not tell from their report how many of their 3 per cent doubtful Kolmer tests were cases of tuberculosis. They were not interested in that phase of the question and consequently did not report them. They do note twenty cases of non-syphilitic pulmonary tuberculosis which are negative with the Kolmer test and either positive or doubtful with the alcoholic antigen.

Kilduff, however, in 1924, reported 4 per cent positive reactions among 100 cases of non-syphilitic tuberculous patients when the Kolmer test was used.

Another report, by Ruscher, a German worker, appeared in 1923, a brief abstract of which is all I have seen. He reports one permanent positive Wassermann test among 90 non-syphilitic tuberculous children. This gives a little less than 1 per cent false positives among the age-group designated as "children."

The one definite fact emerging from these varying reports is that there is a certain percentage of tuberculosis cases which give some fixation with a syphilitic antigen which is non-specific, no matter what technic is employed.

Our experience at the Glen Lake Sanatorium confirms this view. Wassermann tests are taken as a routine procedure on all admissions to the Sanatorium. In analyzing the first 2,000 admissions, it was found

that 1,450 had been so tested, most of them with the Kolmer test. Of these, 11.5 per cent (167) had irregular reactions. These irregular reactions include twenty-three cases having positive tests without signs or symptoms of syphilis, four cases with negative tests and positive findings, forty-one cases having an equal number of positive and negative tests, the remaining ninety-nine made up of cases having doubtful and negative reactions, or doubtful and positive reactions. Ten cases had irregular reactions with positive clinical findings.

The tests were made at the City Laboratory and State Board of Health Laboratory, the bulk of them being done at the latter Laboratory with the Kolmer technic.

This analysis raises a number of questions:

1. What type of tuberculous infection gives these reactions? Are these irregular reactions more prevalent in pulmonary or bone tuberculosis? Does the stage or severity of the disease make a difference?

2. What is the age distribution of these reactions? Ruscher, you recall, reports 1 per cent false positive among tuberculous children. We want to find out if age distribution narrows the problem.

3. Pregnancy is known to give irregular tests. What happens in the tuberculous woman who is pregnant?

Further careful tabulation and observation is being started to give facts on some of these points.

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- Ruscher, E.: Wassermann reaction in tuberculosis. *Deutsch Med. Wchnschr.*, 1923, xlix, 278.

Editor's Note: The question arises whether 10 per cent of irregular reactions is peculiar to tuberculosis cases. Our impression is that a 10 per cent leeway should be allowed in the interpretation of Wassermann reports on cases in general.

#### ARC AND MERCURY VAPOR LAMPS

The carbon arc and quartz mercury arc lamps are generators of ultraviolet energy. The carbon arc lamp delivers about 5 per cent of its total spectral energy in the ultraviolet zone, and the quartz mercury arc lamp delivers about 28 per cent. An erythema dose can be readily obtained with a mercury arc but it requires a considerable exposure in the case of a carbon arc. Some believe that an erythema is necessary, whereas others believe that an erythema is unnecessary, to good clinical results. (*Jour. A. M. A.* April 2, 1927, p. 1102.)

## OBITUARY

### Dr. Henry Winfield Brazie

Dr. Henry Winfield Brazie, 84 years old, died Saturday July 2, 1927, at the home of his niece, Mrs. J. E. Painter, in Minneapolis.

Dr. Brazie was born near Ashtabula, Ohio. When he was 16 years old he enlisted in the seventh Michigan infantry and served with it until he was appointed to the United States secret service. He was stationed in Washington when President Lincoln was assassinated.

During the war he took part in the battles of Ball's Bluff, Yorktown, West Point, Fair Oaks, Second Bull Run, Antietam, Gettysburg and Wilderness. He was wounded at Gettysburg and Antietam. After the war he studied at the University of Michigan, and in 1870 was graduated from the Cleveland Homeopathic college hospital.

He practiced first at Ypsilanti, Mich., and later in Elkhart county, Indiana. In 1880 he came to Minneapolis, where he was in active practice until a year ago. In 1884 he was elected president of the Hahnemann Medical Society of Hennepin county, and vice president of the Minnesota State Homeopathic Institute. He also served as medical director of the G. A. R. in Minnesota from 1884 to 1886.

In 1887 he was appointed to the board of commissioners for the examination of state hospitals for the insane, and served in that post for many years. When the homeopathic department of the University of Minnesota Medical College was organized Dr. Brazie was appointed professor of physiology, and later served as dean. At the time of his death he was president of the G. A. R. pension board of Hennepin county, an office which he had held for 20 years.

He is survived by a sister, Mrs. William Woodruff, Mineral Wells, Texas; his niece, Mrs. Painter; a son-in-law, Dr. M. W. H. Bockman, of Minneapolis; and four grandchildren.

### Dr. Mary E. Towers

Dr. Mary E. Towers, 70 years old, prominent Minneapolis physician, former member of Asbury hospital staff, and a resident of Minneapolis for 35 years, died at her home Friday night, June 10.

Dr. Towers was a daughter of Thomas Matthews, a veteran of the Mexican war. She was born at Algonac, Mich., in 1857. On completion of her high school course, when she was 15 years old, she took up the teaching profession, teaching in schools at Muskegon, Mich., Lincoln, Neb., and Boulder, Col. In 1882 she came to Minneapolis and taught for several years at Adams school, and was principal of Lyndale school.

She entered the medical school at the University of Minnesota, and graduated in 1899 as president of the class, the first woman ever to achieve that honor.

Aside from her prominence as a physician and as a staff member of Asbury hospital for 10 years, Dr. Towers was known as a charity and welfare worker. For many years she had held membership in several charitable and welfare organizations, taking an active part in their work.

Dr. Towers was first president of the Columbia Study Club. She was a member of the G. A. R. Women's Auxiliary, the Union Labor League, and Morgan Women's Relief Corps, and was one of the two honorary members of the Minneapolis Teachers' Association.

Surviving are her husband, Dr. F. E. Towers, of Minneapolis, and three sisters.

### Dr. Gerald Ryan Moloney

Dr. G. R. Moloney, a pioneer physician in his community in active practice for over forty years at Belle Plaine, Minnesota, died Monday, July 18, as a result of injuries received in an automobile accident the evening before.

Gerald Ryan Moloney was in his eightieth year, being born at Carrroughmarka, Doon, County Limerick, Ireland, Jan. 7, 1848. He took his preparatory course in the city of Limerick and in the city of Dublin, and completed his medical education in New York City, where he had come in 1872. After receiving his degree from New York University Medical College in 1875 he practised medicine and surgery a brief while in New York and then came to Minnesota, locating in Belle Plaine.

The year after his arrival he married Hannah Kennedy, sister of the late Mgr. Kennedy who was parish priest of Sacred Heart parish for over forty years. In addition to his medical practice, Dr. Moloney also conducted a drug store during his early years. About ten years ago he definitely retired from active practice.

Despite his age Dr. Moloney was remarkably active. Brisk in manner yet always displaying a formal courtesy that became a gentleman of the old school, he was most companionable and a ready associate with the friends of old days and with the newest acquaintances. During these last years fishing was his great hobby.

Dr. Moloney was a member of a number of fraternal organizations in his community, a member of his county, state and national medical associations and at the time of his death was a director of the First National Bank of Belle Plaine.

Surviving Dr. Moloney are his wife, who was injured in the accident causing the doctor's death, and a daughter, Mrs. D. A. Hanlon of Montgomery, Minnesota.

## REPORTS AND ANNOUNCEMENTS OF SOCIETIES

### RED RIVER VALLEY MEDICAL SOCIETY

The spring meeting of the Red River Valley Medical Society and the Ladies' Auxiliary was held at Crookston, May 27, 1927, with the following program.

The morning session held at Sunnyrest Sanatorium included the following:

1. Diagnostic Clinic on Tuberculosis  
Dr. F. W. Wittich, Minneapolis
2. Sanatorium Treatment  
Dr. Jas. K. Anderson, Sunnyrest, Crookston
3. The County Tuberculosis Survey  
Dr. O. E. Locken, Crookston
4. Inspection of Sanatorium.

A complimentary luncheon was served the attending physicians through the courtesy of the Sanatorium Commission.

The afternoon meeting was composed of the following papers:

1. Acute Pancreatitis  
Dr. J. L. Delmore, Roseau
2. Problems in the Treatment of Renal Lithiasis  
Dr. W. F. Braasch, Rochester
3. Some personal observations in General Surgery  
Dr. J. J. Stratte, Hallock
4. Newer phases of Chronic Cholecystitis  
Dr. M. O. Oppegaard, Crookston.

More than fifty guests were entertained at a banquet held at the Hotel Crookston in the evening.

Following the banquet the guests were addressed by Dr. W. F. Braasch, president of the State Medical Association, on "The State Association," and by Dr. A. C. Dean of Crookston on "The District Society and Legislation." Dr. W. F. Braasch and Dr. F. W. Wittich were elected honorary members of the society.

### SCOTT-CARVER COUNTY MEDICAL SOCIETY

A regular meeting of the Scott-Carver County Medical Society was held at New Prague, Minn., April 21, 1927, Dr. F. W. Maertz, president of the society, presiding.

Dr. O. W. Yorg, Minneapolis, read a paper on "Acute Gastric and Duodenal Ulcer." Dr. S. Marx White gave an instructive address on "Tachycardia."

The New Prague Community Hospital Association entertained the society at a seven o'clock dinner at the Hotel Bros.

By invitation of Dr. James McKeon the Society held its annual meeting at Montgomery, Minnesota, June 2, 1927. The members were entertained at a banquet at the Hotel Alba.

Officers for the year 1928 were elected as follows: President, Dr. W. F. Maertz, New Prague; vice president, Dr. E. J. Eklund, Norwood; secretary-treasurer, Dr. H. W. Reiter, Shakopee. Dr. B. H. Simon and Dr. H. M. Juergens were elected as censors. Dr. F. J. von Bohland, Belle Plaine, was elected delegate to the



state meeting with Dr. H. A. Schneider, Jordan, as alternate.

Dr. F. Westermann gave a report on the Publicity Chairmen's Conference held in March at St. Paul.

Dr. P. F. Donohue, St. Paul, discussed the subject "Renal Calculi," illustrated with lantern slides and x-ray pictures.

#### STEARNS-BENTON COUNTY MEDICAL SOCIETY

A report of the meeting of the Stearns-Benton County Medical Society held at Richmond, May 25, 1927, showed an attendance of twenty-six members.

The program included the following papers:

1. Presentation of Cases of Duodenal Ulcer  
Dr. R. N. Jones, Richmond, Minnesota  
Discussion: Dr. C. B. Lewis, St. Cloud, Minnesota
2. Senile Cataract  
Dr. H. E. McKibben, St. Cloud, Minnesota  
Discussion: Dr. T. N. Fleming and Dr. W. L. Freeman, St. Cloud, Minnesota
3. Massive Lung Collapse  
Dr. C. S. Sutton, St. Cloud, Minnesota  
Discussion: Dr. R. H. Sweetman, Sauk Centre, Minnesota
4. Surgical Problems  
Dr. A. A. Meyer, Melrose, Minnesota.

A rising tribute to Dr. H. A. Pinault, St. Joseph, Minnesota, whose death occurred May 21, 1927, was given.

Twenty members of the Stearns-Benton County Medical Society met at Belgrade, Minnesota as the guests of Dr. F. S. Richardson June 22, 1927, at 6:00 p. m.

Program:

New Methods on Posterior Occiput

Dr. William Friesleben, Sauk Rapids, Minnesota.

Discussion: Dr. R. H. Sweetman, Sauk Centre, Minnesota.

Surgical Problems

Dr. A. A. Meyer, Melrose, Minnesota

Discussion: Dr. C. B. Lewis, St. Cloud, Minnesota

Discussion: Dr. Chas. S. Sutton, St. Cloud, Minnesota

Pre-operative Sterilization of Skin

Dr. F. S. Richardson, Belgrade, Minnesota

Discussion: Dr. R. N. Jones, Richmond, Minnesota

Value of Ophthalmoscope in General Practice

Dr. T. N. Fleming, St. Cloud, Minnesota

Discussion: Dr. Julius Buscher, Albany, Minnesota

Chronic Constipation

Dr. H. B. Clark, St. Cloud, Minnesota

Discussion: Dr. C. F. Brigham, St. Cloud, Minnesota

Discussion: Dr. O. A. Groebner, Cold Spring, Minnesota.

A committee composed of Dr. Fleming, Dr. Lewis, and Dr. Brigham was appointed to consider a perma-

nent memorial for the Stearns-Benton County Medical Society.

#### WABASHA COUNTY MEDICAL SOCIETY

The fifty-ninth annual session of the Wabasha County Medical Society was held at Lake City, Thursday, July 7, 1927.

The following program was presented:

President's Address—"Our Society"

Dr. J. S. Collins, Wabasha

"Perinephritic Abscess," with Illustrative Case

Dr. Wm. P. Herbst, Minneapolis

"Bovine Tuberculosis and Its Relation to Man"

Dr. A. S. Anderson, Buena Vista Sanatorium, Wabasha

"The Cults and You"—Lantern Slide Illustrations

Dr. Wm. A. O'Brien, Pathologist, University of Minnesota Hospitals.

Report of the Discussion on Immunization against Scarlet Fever and Diphtheria, at the State Sanitary Conference, June 15

Dr. E. H. Bayley, Health Officer, Lake City.

Two new members were admitted: Dr. Arnold S. Anderson of Buena Vista Sanatorium, Wabasha, by transfer, and Dr. William R. R. Loney of Plainview, by primary application. Dr. J. S. Tenney of Alma, Wisconsin, was made an honorary member.

The following officers were elected for the coming year: President, Dr. W. J. Cochrane, Lake City; vice president, Dr. A. S. Anderson, Wabasha; secretary-treasurer, Dr. W. F. Wilson, Lake City; delegate to State Association (1928), Dr. D. S. Fleischhauer, Wabasha; alternate, Dr. J. S. Collins, Wabasha; censor for three years, Dr. J. A. Slocumb, Plainview.

It was voted to hold the next annual meeting at Plainview.

In a few well chosen remarks, the presiding officer, Dr. J. S. Collins of Wabasha, thanked all those who took part in the entertainment, and especially Dr. Wm. P. Herbst and Dr. Wm. A. O'Brien of Minneapolis, for their interesting and instructive addresses.

#### WEST CENTRAL MINNESOTA MEDICAL SOCIETY

Drs. Bolsta, Karn, O'Donnell and Shelver of Ortonville entertained the members of the West Central Minnesota Medical Society and their ladies at an outing held at that place, June 19, 1927. Dr. Herman Johnson of Dawson was a guest on that occasion.

The next meeting will be held at Morris, October 12, 1927. This will be the annual meeting and officers for the coming year will be elected at that time.

"Again, as blood was always regarded as the fountain of life, to drink the blood of a warrior, or still better to eat his raw heart, was to transfer his bravery therewith to the consumer. But as human hearts were not often available, the heart of a bold beast, as the lion, was regarded as not much less efficacious; . . . the physicians who dissected Cyril cut off and ate the holy episcopal liver."—Allbutt, *Greek Medicine in Rome*, 1921, p. 53.

## OF GENERAL INTEREST

Dr. H. G. Franzen of Minneapolis returned in July from a two months' stay in Europe.

Dr. I. L. Harshbarger, Rochester, was married to Miss Gertrude Ackerman at Mankato on Thursday, June 30.

Dr. C. A. Hallberg announces the removal of his offices to 610 Yeates Building, 823 Nicollet Avenue, Minneapolis.

Dr. Emmett V. Kenefick, St. Paul, has opened offices in the Lowry Building and will limit his practice to internal medicine.

Dr. Henry Reiniets of Rochester was married June 15 at Sheldon, Iowa, to Miss Martha Ann Kruse, of Woodstock, Minnesota.

Dr. and Mrs. Walter E. Camp, Minneapolis, are the parents of a daughter, Lucille Kinney Camp, born Monday, June 13, 1927.

Dr. G. H. Baxter has returned to Rochester from his home in California. He was married on July 7 to Miss Ruth Coleman at Berkeley.

Dr. C. F. Kemper announces the removal of his office to 930 Metropolitan Building, Denver. His practice is limited to internal medicine.

Dr. Philip D. Woodbridge, of Portland, Connecticut, has come to the Mayo Clinic, Rochester, as first assistant in the Section on Anesthesia.

Dr. and Mrs. Emil Geist, St. Paul, and their three children sailed June 18 from New York for Europe, where they will spend the summer.

Dr. Gerald P. Dunne has announced the opening of offices at 619 Hamm Building, Saint Paul, for the practice of obstetrics and gynecology.

Dr. Seymour R. Lee will remain at the Ancker Hospital, St. Paul, as resident physician and Dr. Gordon W. Strate as resident the ensuing year.

Dr. R. B. McKnight has opened offices at 217-218 Professional Building, Charlotte, North Carolina, for the practice of surgery and surgical diagnosis.

Dr. Magni Davidson, who has been the resident surgeon at Ancker Hospital, St. Paul, has been appointed assistant superintendent of the hospital.

Dr. J. W. Thompson of Rochester was married June 29 to Miss Marjorie Hyslop at Fulda, Minnesota. His brother, Dr. G. J. Thompson, acted as best man.

Dr. T. M. Jones has been granted leave of absence by the Mayo Foundation and goes today to Montreal to be with the Hudson Bay Company for a time.

Dr. Frank C. Goodwin is doing additional hospital work at the Gillette Hospital, Phalen Park, St. Paul, after completing his internship at Ancker Hospital.

Dr. D. R. Heetderks of Rochester will locate in the near future in Grand Rapids, Michigan, where he will limit his practice to otolaryngology and bronchoscopy.

Dr. E. T. Brading has been granted a year's leave of absence from the Mayo Foundation. He will spend the summer in New York State as physician in two camps.

Dr. T. L. Harschbarger, who has been a Fellow in Surgery at the Mayo Clinic for three years, is now as-

sociated with Dr. D. C. Patterson in Bridgeport, Connecticut.

Dr. W. H. Bueerman has announced the opening of offices at Suite 1015 Corbett Building, Portland, Oregon, for the practice of surgical diagnosis and general surgery.

Dr. G. C. Anderson has left Rochester, where he has been associated with the Mayo Clinic, and has gone to New Orleans, where he plans to practice neurologic surgery.

Dr. and Mrs. George T. Ayres and daughter, Florence, of Ely, Minnesota, are spending the summer in Europe. Dr. Ayres is a member of the Shipman Hospital staff at Ely.

Dr. Magee, who has been at the Johnstone-Wickett Clinic at Anaheim, California, for two and a half years, has returned to Rochester to resume his fellowship in medicine in the Mayo Foundation.

The marriage of Miss Mary Celestine Hoy of Minneapolis to Dr. Edward A. Regnier, also of Minneapolis, was solemnized Wednesday, June 22. Dr. and Mrs. Regnier will reside in Minneapolis.

Dr. J. R. Aurelius, who has been a Fellow in Radiology at the Mayo Clinic, Rochester, for the last two years, has gone to St. Paul, where he will be associated with the Earl Clinic, 1012 Lowry Building.

Drs. M. F. Fellows, H. F. Flanagan and R. J. Hanna are taking additional hospital work at the Buffalo City Hospital, New York, following completion of their internship at Ancker Hospital, St. Paul.

Dr. James L. Benepe of St. Paul has completed his internship at Ancker Hospital and is now associated with Dr. H. E. Binger at 826 Lowry Building in the practice of eye, ear, nose and throat specialties.

Announcement has been received of the marriage of Dr. Joseph Graham Mayo and Miss Ruth Rakowsky of Joplin, Missouri, which occurred June 11 at Joplin. Dr. and Mrs. Mayo will make their home at Rochester, Minnesota.

At Brainerd, Minnesota, June 15th, Dr. E. S. Murphy and Miss Edith Bartsch were married. They will be at home in Glendive, Montana, after a wedding trip in the east. Dr. Murphy is on the staff of the N. P. B. A. Hospital in that city.

Among the Minnesota physicians who are making the Interstate Post Graduate Assembly tour of European clinics this summer are Drs. E. I. Lindgren, Duluth; C. L. Larsen, St. Paul; J. G. Ericson, Minneapolis, and H. J. Thornby, Moorhead.

Mrs. Edward Holmes Payte of Saint Paul has announced the marriage of her daughter, Constance, to Dr. Frederick W. Van Valkenburg, son of Dr. and Mrs. B. F. Van Valkenburg of Long Prairie, Minnesota, which took place Tuesday, June 21, 1927.

Dr. Herbert Chamberlain of New York, who will succeed Dr. Smiley Blanton as director of the Minneapolis child guidance clinic, arrived in Minneapolis July 13. Dr. Blanton is leaving Minneapolis to take up research work in psychiatry at Vassar College.

Dr. W. P. Sherill, who has been with Dr. H. F. Helmholtz, Rochester, for the last year, has left with

his family for San Diego, where he will enter the practice of pediatrics, as an associate of Drs. Sharp and Woods. His address will be 420 Walnut Street.

Announcement has been made that a new twenty story medical and surgical building is to be erected in Minneapolis at Third avenue south and Tenth street. The main part of the building is to be twelve stories high, with the eight upper floors constructed in tower form. Work is to begin on the structure this fall.

The election of officers of the Medical Alumni Association of the University of Minnesota held at their annual luncheon at Duluth in July resulted in the following: President, Dr. O. S. Wyatt, Minneapolis; vice president, Dr. Martin C. Bergheim, Hawley, Minnesota; secretary-treasurer, Dr. Donald Daniel, Minneapolis.

Drs. G. E. Sherwood and Clarence Jacobson of Kimball, Minnesota, entertained members of the Stearns-Benton County Medical Society with a picnic at Dr. Sherwood's summer resort at Pearl Lake, July 27. The invitation included the doctors and their families. As a novel part of the program the guests visited Dr. Sherwood's famous Guernsey dairy.

Dr. William H. Feldman has come to the Mayo Clinic to take Dr. Hardenbergh's place with Dr. Mann at the Institute of Experimental Medicine. Dr. Feldman took the degrees of V.D.M. and M.S. from the Colorado State Agricultural College. He has been on the faculty in the Department of Veterinary Pathology at this college until coming to the Clinic.

Dr. H. Longstreet Taylor, St. Paul, with Mrs. Taylor and their two children sailed in June for London. Dr. Taylor addressed the British Sanatorium Association and the National Tuberculosis Association of England at their annual meetings in London in July. Before returning home Dr. Taylor and his family will visit points of interest in England, France and Holland.

Dr. C. J. Rohwer has been awarded a fellowship with the National Committee for Mental Hygiene, and has left the Manhattan State Hospital, Ward's Island, New York, to go to Chicago to work under the direction of Dr. Herman Adler at the Institute for Juvenile Research, 907 South Lincoln Street. Dr. Rohwer was married May 12 to Miss Cornette Fisk of Spokane, Washington. The wedding took place in New York City.

Dr. F. W. Schlutz of Minneapolis sailed June 25 for South America where he has been officially invited by the Argentine Medical Society and the Argentine Pediatric Society to give several lectures before their respective groups. Dr. Schlutz will also lecture at the University of Rio de Janeiro, Montevideo, Buenos Aires, and on his return home by way of the Pacific at Lima. Dr. Schlutz will return to Minneapolis about September first.

Dr. Herbert Lampson of Duluth died recently following an operation for appendicitis. His activities as health officer of St. Louis county and in tuberculosis work caused him to be widely known throughout the Northwest. He was a member of the executive committee of the Minnesota Public Health Association and was recently elected president of the Minnesota State

Sanitation Conference. Dr. Lampson is survived by his widow, two sons and a daughter.

Mr. and Mrs. George Pierce Adams of Blackstone, Virginia, have announced the marriage of their daughter, Martha Lee, to Dr. Holcombe H. Hurt on June 15, 1927. Dr. and Mrs. Hurt will make their home in South Boston, Virginia, where Dr. Hurt is in practice.

Dr. N. O. Pearce and members of a committee of investigation appointed from the Hennepin County Medical Society recently made a survey of the situation existing in the matter of free patients cared for in the general hospitals in Minneapolis and have turned over the report covering 200 patients to the Board of Public Welfare of Minneapolis. The report is now on file in the offices of the Hennepin County Medical Society and is open to anyone interested in reading the findings of the committee.

At the Commencement at the University of Minnesota in June the following Fellows of the Mayo Foundation received advanced degrees: Drs. G. C. Anderson, P. G. Flothow, N. C. Ochsenhirt, and W. W. Sager will receive the degree of Master of Science in Surgery; Drs. H. V. Dobson and L. E. Prickman the degree of Master of Science in Medicine; Dr. H. D. Caylor the degree of Master of Science in Pathology, and Dr. Heetderks the degree of Master of Science in Otolaryngology. Miss Blanche Peterson will receive the degree of Master of Arts for work done in Sociology in the Mayo Foundation.

An informal ceremony in connection with the laying of the cornerstone of the new Mayo Clinic building was held Wednesday, June 22, 1927. Remarks were made by Dr. Charles H. Mayo and Dr. H. S. Plummer.

The following articles were placed in the cornerstone: a copy of "Sketch of the History of the Mayo Clinic and the Mayo Foundation," a copy of "Physicians of the Mayo Clinic and Mayo Foundation," copies of the Clinic Bulletin, and of the Surgical Bulletin, lists of the professional and non-professional personnel of the Clinic, one of each of the coins now in use in this country, lists of the county and city officials, a report of the Rochester State Hospital, the combined Surgical Reports of the Mayo Clinic and St.

A cash prize of \$250.00 is offered by the Minnesota Society of Internal Medicine to any regular practicing physician in the State of Minnesota for the best thesis on some subject related to clinical internal medicine, or to research in the medical sciences related to internal medicine.

The purpose of this prize is to stimulate the research spirit in practitioners of medicine, and therefore is to be awarded only to physicians in active practice of clinical medicine (not limited to internists).

Physicians in the employ of the United States Army, Navy, or Public Health Services, whose legal residence is in Minnesota, are eligible.

The prize will not be awarded to any member of this Society.

All theses must be submitted before Dec. 31, 1927. Candidates should notify the secretary, Dr. E. L. Gardner, 610 Yeates Building, Minneapolis, Minnesota.

Mary's Hospital, copies of the Rochester Post-Bulletin for June 22, 1927, and other copies of the same publication containing accounts of the Lindbergh and the Chamberlain-Levine flights.

## PROCEEDINGS OF THE MINNESOTA ACADEMY OF MEDICINE

Meeting of May 11, 1927.

The regular monthly meeting of the Minnesota Academy of Medicine was held at the Town and Country Club on Wednesday evening, May 11, 1927, at 8 o'clock. Dinner was served at 7 o'clock.

The meeting was called to order by the Vice-President, Dr. John E. Hynes. There were 29 members present.

Minutes of the April meeting were read and approved.

The scientific program was as follows:

DR. C. F. NOOTNAGEL (Minneapolis) read a paper entitled "Extra-Gastric Closure of the Pylorus."

Starting out with the well-established fact that suspension of function of any organ irritated or inflamed will enhance its recovery—for example, putting an inflamed knee-joint at rest enhances its recovery—the same holds good for all other inflamed or irritated parts of the body. Therefore, when we have an ulcer of the duodenum or of the pyloric end of the stomach, a suspension of function of this part of the alimentary tract would be an ideal treatment for its healing. In order to attain this suspension of function the present-day treatment has been a gastrectomy of the pyloric end of the stomach associated with a gastroenterostomy. This procedure is attended by a varying operative mortality of a rather high degree. In order to avoid some of the risks of a gastrectomy, I cast about for some other means to attain the same result. Dogs were chosen for the investigation of extra-gastric closure of the pylorus, and simultaneously some of the conclusions of Alvarez on peristalsis and reverse peristalsis were to be utilized by administering 2 drams of metallic Hg after each anesthesia in order to lessen the tendency to post-operative vomiting (reverse peristalsis). Alvarez (p. 18) has shown the characteristic of smooth muscle in hollow organs is its responsiveness to tension. Most of the motor activities of the stomach and bowel are brought about and regulated largely by the internal pressure due to the presence of food, gas or other contents. Cannon (p. 187) has shown that the rhythmic segmentation in the small intestine is due simply to the fact that those muscle fibres which are stretched tend to contract. Their contraction increases the pressure in neighboring segments and so the process goes on. As Cannon points out, these reactions to stretching are purely local and are not brought about by nervous reflexes. Alvarez (p. 37) points out that in the gastrointestinal tract there is a gradient of rhythmicity and (p. 41) a gradient of propulsive force, and (p. 53) a gradient of irritability extending from the stomach to the rectum. Therefore the Hg was ad-

ministered to start the contractions in the alimentary tract in the right direction after anesthesia in the hope that contractions started properly would continue thus and avoid vomiting. Alvarez (p. 120) points out that vomiting can sometimes be stopped by giving solid food which may act perhaps by raising the tone of the stomach and restoring the downward gradient. The following investigation will show how this procedure worked in dogs.

The operative procedure to close the pylorus wholly or partially was performed in three different methods:

1. The pyloric muscle, one-half inch wide, was raised anteriorly from the submucosa beginning at the gastrohepatic omentum and ending at the gastrocolic omentum, where it was cut across, an opening was made through the gastrocolic omentum, the dissected pyloric muscle was pushed through this opening and sutured to the posterior gastric wall on top of the peritoneum. This maneuver necessitated the folding of the anterior gastric wall upon itself.

2. A strip of peritoneum and pyloric muscle, an inch wide, was raised in the same manner as the first, an opening made through the gastrocolic omentum, the posterior gastric wall was incised down to the submucosa, the edges of the incised peritoneum and pyloric muscle were spread apart and the anterior strip—after folding the anterior gastric wall upon itself—was securely sutured, muscle to muscle and peritoneum to peritoneum.

3. The pylorus was telescoped into the stomach and securely sutured by three rows of No. 1 twenty-day chromic catgut, taking good bites through peritoneum and muscle.

**Results:** Five dogs were anesthetized for thirty minutes and 2 drams of Hg administered. No emesis followed in any of them.

February 20, 1926. No. I. Pyloric closure by first procedure, posterior gastroenterostomy, administration of 2 drams Hg. No emesis.

February 26, 1926. No. II. Died from careless anesthesia before operation.

March 3, 1926. No. III. Pyloric closure by first procedure; 2 drams Hg. No emesis.

March 8, 1926. No. IV. Pyloric closure by second procedure; 2 drams Hg. No emesis.

March 10, 1926. No. V. Pyloric closure by second procedure; 2 drams Hg. No emesis.

May 4, 1926. No. VI. Pyloric closure by second procedure, with the addition of suturing the edges of the anterior gastric incision together; administration of 2 drams Hg. No emesis.

May 11, 1926. No. VII. Pyloric closure by third procedure; 2 drams Hg. No emesis. The wound became infected and the dog died on the 8th day. Post-mortem revealed generalized peritonitis.

June 1, 1926. No. VIII. Pylorus closed by third procedure; 2 drams Hg. No emesis. Eventration 7th day; death 8th day.

June 12, 1926. No. IX. Pylorus closed by third procedure; 2 drams Hg. No emesis. Dog died the 7th day without showing any peritonitis, wound healed.



Nos. VII, VIII and IX all showed beginning gangrene in the pylorus.

March 12, 1926. Nos. I and III x-rayed an hour after a barium meal; stomach empty.

March 22, 1926. No. IV. X-rayed half an hour after barium meal; closure good, 70 per cent empty.

March 22, 1926. No. V. X-rayed half an hour after barium meal; closure good, 30 per cent empty.

May 15, 1926. No. VI. X-rayed half an hour after barium meal; closure good, 50 per cent empty.

April 9, 1926. No. I. Pylorectomy; pylorus partially closed; 2 drams Hg. No emesis.

April 12, 1926. No. III. Pylorectomy, poor closure; 2 drams Hg. No emesis.

April 21, 1926. No. IV. Pylorectomy, good closure; 2 drams Hg. No emesis.

April 27, 1926. No. V. Pylorectomy, good closure; 2 drams Hg. No emesis.

June 10, 1926. No. VI. Pylorectomy, good closure; 2 drams Hg. No emesis.

All external wounds were closed by subcuticular suture and smeared over with several applications of collodion. None of the dogs licked their wounds open except No. VIII, and in this we were not certain what caused the fatal result.

I have operated on one patient for duodenal ulcer by the second procedure, with a good result.

History: Man, 48 years old, family history negative; past history negative; occupation flour-bolter. During the night of November 1, 1926, he was seized with incessant vomiting after indulging in a generous midnight meal of chow mein. I saw him November 2, 1926, still vomiting, and this continued with slight variations to December 15, 1926, when he suffered a severe gastric hemorrhage. He was sent to the hospital and transfused a number of times with great benefit. December 29 we considered an x-ray safe and found him suffering from a duodenal ulcer. On February 4, 1927, preceded by a transfusion, I operated upon him by the second procedure and he made a splendid and uneventful recovery. He resumed his occupation April 25, 1927.

The ulcer was situated about two and one-half inches below the pylorus facing the gallbladder. There were many adhesions extending from the duodenum to the gallbladder and the liver.

April 2, 1927, x-rays were made, showing good occlusion of the pylorus, although some barium could be forced through the pylorus by kneading the stomach vigorously.

**Summary:** Five dogs subjected to fifteen anesthetics, each time being given Hg 2 drams, without emesis. Three additional dogs were anesthetized and operated and Hg 2 drams given without emesis. The first five dogs were each operated on twice without a single death. The additional three dogs were subjected to but one time of operation and all died, one from peritonitis, one from evisceration, and the other from beginning gangrene of the pyloric portion of the stomach, and I feel that the first two would eventually have died of gangrene of the pyloric portion of the stomach if no intercurrent trouble had killed them.

The specimens removed all showed beginning gangrene. The best closure was in No. VI as evidenced by the specimen. In this case the edges of the anterior incision were brought together and sutured, throwing the underlying mucosa and submucosa into folds strengthening the occlusion.†

#### DISCUSSION

DR. A. SCHWYZER (St. Paul): This just shows again that there are several roads that lead to Rome. In closing the pylorus I have used three different methods. By putting a double forty-day chromic catgut around the pylorus in some cases we have sufficient effect, where we had to be in a hurry, but were anxious to protect a bleeding or perforating duodenal ulcer. For many years we have closed the pylorus in every case of bleeding or perforating duodenal ulcer, where the ulcer could not be excised. Catgut, of course, is only of very temporary protection, and was used a few times after suture of perforated ulcers. Then we have taken fascia, about half an inch wide, from the edge of the rectus sheath, thrown it around the pyloric portion of the stomach, and fastened the ends together with two or three linen stitches. In two cases we could control things afterwards. In one case there was nothing to be found any more; the fascia was absorbed. In another case where I had done this, I had to operate again four or five years later for a tuberculous appendicitis and peritonitis. We pulled the stomach into view and saw a very pretty picture. The fascia had become round and smooth and looked like mother-of-pearl. There were no adhesions to the surroundings.

In my last cases I have used the round ligament of the liver, which seemed an improvement. It is freed from its attachment to the navel, thrown around the pylorus and fastened with linen or silk sutures. We thus have a living structure, which ought to guard against absorption.

Dr. Nootnagel's procedure attacks the pylorus itself, as von Eiselberg does in the radical division of the pylorus. Where a permanent impermeability is attempted, the more extensive procedures will give greater assurance.

DR. H. A. DOUMAN (Minneapolis): I would like to know more about the mercury.

DR. NOOTNAGEL (in closing): I read in a book about 100 years old that they gave mercury for intestinal obstruction. Evidently they did not know much about the pathology of intestinal obstruction, but some of the cases got well. And after reading Alvarez's book, I decided that if you put anything in the intestine that is heavy you start peristaltic movements. I put it in with a stomach tube. It will start the gradient of rhythmicity in the stomach and it will go on down. I was under the impression that if you could start that right it would keep on. I don't know how right or wrong it is, but none of these dogs vomited; some retch after the stomach tube is put in and taken out,

†Bibliography:

Walter C. Alvarez: The Mechanics of the Digestive Tract.  
W. B. Cannon: The Mechanical Factors of Digestion.

but no mercury came up. We had 18 in which we gave mercury and not one vomited.

I operated on a woman the other day and I feel sure that we could have saved her if we had given her mercury in time. She died of post-operative ileus.

(How much do you give?)

They gave patients up to 1 oz. in weight in that book I read. I was just casting about to see if I could find something to avert vomiting in operations on the stomach.

DR. A. R. HALL (St. Paul) reported a case of Diffuse Primary Thrombosis of the Vessels of the Lung:

The case history which I wish to present is that of a man who, at the time of his death on March 16, 1927, was 73 years of age. He was born in Scotland and was by occupation a building contractor.

There was nothing of significance in his family history. As a child he had had measles. At the age of 23 he was said to have had pleurisy. When 27 years old he sustained a fracture of the right leg, and in 1906 he had an operation for an inguinal hernia. During the past ten years he had, on several occasions, a mild bronchitis which lasted a few days only. In December, 1925, he had a respiratory tract infection which began acutely with a chill. His temperature in this illness ranged from 100° to 102°, pulse from 80 to 95, and leucocytes 12,600. There was a mucopurulent expectoration but no blood. The chest showed moist râles scattered throughout, but no demonstrable consolidation. He recovered from this attack in about two weeks.

He was accustomed to use considerable tobacco, and although he did not use alcohol regularly, he had, up to ten years ago, occasionally taken alcoholic beverages to excess.

Since the early fall of 1926 he had noticed some shortness of breath on exertion and had had a slight cough, but no expectoration. About November, 1926, he began to notice some slight swelling of the ankles. There was a gradual increase of the dyspnea, and of the edema of the ankles.

When examined in the early part of February, 1927, he complained of shortness of breath on exertion, a sense of tightness in his chest, and a cough, but still very little expectoration. He said he felt most comfortable when sitting in a chair, but could sleep when lying flat in bed. He was most comfortable when lying upon his face. (This had not previously been his customary ways of sleeping.)

He was a strongly built, muscular man. There was moderate edema of the legs and slight cyanosis of the lips and fingers. He had a large chest which was deep in its antero-posterior diameter. Although he was complaining of dyspnea, the respirations were only about 20 to the minute unless he exerted himself, as in removing his clothing for examination. The respiratory excursion was limited. Percussion note was somewhat hyper-resonant. Breath sounds were heard normally throughout the chest with no accompanying râles. Pulse rate was 82 per minute and regular. The radical

arteries were palpable but not decidedly sclerosed. The cardiac impulse could be felt inside the nipple line and was not unusually strong or diffuse. Cardiac dullness extended rather widely, both to the right and left, and on percussion gave a total dullness of 14 cm. The heart sounds were heard both at the apex and base. There was some accentuation of the pulmonary second sound. There was a soft, short systolic murmur at the base not transmitted to any great distance in any direction. His liver could be palpated one finger's breadth below the costal border, but was not tender. Otherwise there was nothing of note in the physical examination.

He remained in much the same condition until he was sent to the hospital on March 14, 1927. The edema had increased slightly. A moderate cyanosis remained and he continued to complain of a sense of oppression in the chest, and of shortness of breath. It was not thought that he was in any immediate danger. However, after being in the hospital 32 hours he rang for the nurse, complained of great oppression in the upper chest, and in a few minutes was dead. There had been no fever, his pulse usually ran between 80 and 95, his respiration from 18 to 24. His chest was practically always free from any abnormal sounds, but occasionally during his last illness there had been a few scattered moist sounds, never any dry râles. Although the edema of the legs had increased, it was never very marked, and the same was true of the cyanosis. His blood pressure had been recorded in 1921 as 140 systolic and 80 diastolic. In November, 1926, it was 130 systolic and 80 diastolic. In February, 1927, it was systolic 130 and diastolic 75. No electrocardiograms were taken. His urine was normal in amount and specific gravity, and had shown nothing abnormal except that since February there had been a trace of albumin. In 1921 there had been x-ray plates of his chest taken. In these the heart did not show any definite enlargement and there was nothing of note in the lung shadows, but there were some enlarged glands about the lung hilus on either side. He was thought to have a mild emphysema and a degenerated heart muscle caused probably by sclerosed coronary vessels.

An autopsy was done by Dr. Warwick about nine hours after death. It was found that the heart was very definitely enlarged (weight 710 grams) and while both sides were hypertrophied and dilated, this was definitely more marked in the right heart than in the left heart. At the root of the pulmonary artery, just about 3 cms. above the attachment of the valve leaflet, there was a grayish red thrombus, which was firmly attached to the vessel wall and which occupied two-thirds of the space of the lumen. Superimposed on this old gray thrombus was a recent, soft, red thrombus which entirely filled the remaining lumen of the vessel and caused complete occlusion. These thrombi, both the older and the recent, extended down to the pulmonary artery where it entered the lung on either side and the fresh thrombus completely filled the lumen of the vessel at the point of bifurcation. This

thrombus did not show definite organization except near the point of its attachment. It was very firmly adherent to the intima of the pulmonary artery over the entire side where it was located. When separated, it left a slightly roughened reddish surface. It would seem that this gray thrombus had existed at least for some days. There were no obvious changes in the walls of these arteries. The coronaries appeared to be entirely normal and the root of the aorta showed slightly raised, yellowish plaques.

The right lung weighed 730 grams and the left lung 640 grams. Both were dark in color, probably from black pigment. The edges of the lobes showed moderate emphysema. Gross sections showed no areas of consolidation but simply a dry, fluffy parenchyma in which there was marked deposit of black pigment. Practically all of the branches of the pulmonary artery were occluded by thrombi. In many instances these thrombi were attached to the vessel walls, which appeared thickened throughout. Many of the smaller branches, out near the periphery, showed a thickening which made them resemble much larger vessels. On microscopic examination the pulmonary artery in all of its branches throughout the lungs showed an infiltration with lymphocytes and occasional pus cells throughout the wall. Practically all of these vessels were occluded by thrombi which were attached to the wall at one of several points, and which showed in some instances a beginning regeneration. The walls of the pulmonary artery just above the pulmonary leaflets showed the same cellular organizations and there was a beginning organization of the attached thrombi.

The spleen weighed 250 grams; capsule was gray in color and covered by numerous white nodules, in which there were deposits of calcium salts, and which evidently represented an old perisplenitis.

The liver weighed 2,540 grams, was pale in color, with prominent red mottlings, giving the nutmeg appearance of chronic, passive congestion.

The kidneys each weighed 180 grams; capsules stripped easily, leaving smooth, shiny surfaces. On the left side there was a depressed scar which gave a puckered appearance. Gross sections showed cortices to be slightly thin with markings distinct.

There were enlarged lymph nodes at the bifurcation of the trachea, dark in color, homogeneous in consistency and showing no evidence of either calcification or caseation.

The aorta showed throughout its entire length numerous slightly raised yellowish patches. These had no calcification or ulcerations.

There was nothing else of note in the general autopsy findings except that this tendency to thrombosis of the arteries was not present in any of the viscera except the lungs.

We had, then, a diffuse thrombosis of the arteries of the lungs and with its changes in the vessel walls with no similar changes of the vessels of any of the other viscera, and apparently due to the increased resistance of the blood current in the lesser circulation there was produced an hypertrophy and dilatation of

the right heart, with symptoms of failure of the right heart: dyspnea, edema and cyanosis.

This is the first opportunity I have had to see such a case but a number of cases have been written up by different authors. Eppinger, in 1920, reported in detail five cases that had come under his observation, and he collected fourteen more from the literature. Gehrt, in 1923, reported seven cases in 660 autopsies at the Children's Hospital in Berlin. Some of these were in quite young children. Two of his cases had had gripe and five had had measles. All had had a more or less protracted pneumonia. In some of his cases bacteria were found in the thrombi and vessel walls. In one report a reference is made to a case reported by Flexner and Welsh, in which the influenza bacillus was found in the thrombi (I have not seen the original report of this case). Lang gives the history of a patient in whom the symptoms began shortly after an attack of typhus. In most of the cases reported there has been much more edema and cyanosis than in our case. It is probable that had this case not been carried off suddenly by the large thrombus in the pulmonary artery he too would have progressed to severe symptoms of heart failure.

Various diagnoses have been made in these cases during life, but rarely the right one. But, when two or three cases have come under the observation of the same man a correct diagnosis has frequently been made and it has been made through the demonstration of an enlarged right heart and the failure to find any of the usual reasons for this right heart enlargement, such as mitral disease, emphysema, fibroid lungs, or congenital heart. In many of the reported cases mention is made of the dilatation of the pulmonary arteries at the root of the heart and of a corresponding narrowing of the pulmonary veins. (This was not noted in our case.) Mobitz, in describing the x-ray findings, lays stress on the clear-cut second bulge on the left side of the heart shadow. This, he thinks, should suggest a widening of the pulmonary artery.

As to the cause of the thrombosis, no proven theories have been put forward. It occurs at all ages and it does not seem to be at all related to arteriosclerosis. There seems to be some evidence that it is an inflammatory process produced by bacteria. In our case there at least was a round-celled infiltration of the vessel walls. It is possible that the patient's previous respiratory tract infections had something to do with the inflammatory reaction in the arterial walls, and in the formation of the thrombi.

#### DISCUSSION

DR. H. L. ULRICH (Minneapolis): This is a most extraordinary case. The question in my mind is whether we ought to emphasize the thrombosis or the arteritis. Thrombosis in most instances is due to some infection. Here the infection in the vessel walls predisposed to thrombosis. The case reminds me of one we had at the General Hospital, a man about 30 years old, who was treated for six or seven months for a cardiac condition. He had right sided hypertrophy and

left sided hypertrophy too. There was no cyanosis, but evidence, near the end, of congestive failure. The interns hung on him the diagnosis of fibroid tuberculosis, then hyperthyroidism; then, as a cardiac murmur developed, of subacute bacterial endocarditis. Chronic mediastinitis, chronic pericarditis were also suggested. At postmortem he had pulmonary arteritis with multiple thrombosis. The systemic circulation was free. There was a mural thrombus in the left ventricle.

The only clinical signs of this condition are hemoptysis and right sided hypertrophy. Of course we are on the lookout for another case.

DR. HALL (in closing): My understanding of the condition is the same as that expressed by Dr. Ulrich, that is, that it apparently begins as an inflammatory process in the vessel wall and that the thrombosis is secondary to this inflammatory process.

DR. A. E. BENJAMIN (Minneapolis) reported a case of Mesenteric Cyst:

Patient, Mrs. F. M. A., age 53, housewife, married 30 years, American; height 5 feet 8 inches; weight 115 pounds. Patient has lost a great deal in weight. The patient's father died at 79 of hiccough; mother at 72 of tuberculosis; an aunt died of tuberculosis and a grandfather died of cancer.

Past history: Patient had influenza in 1918; had mumps at 35; rheumatism for 20 years, especially in the hands; appendicitis 5 years ago. Patient's teeth have not been attended to of late. The patient is nervous and irritable. Has palpitation and fluttering of the heart at times; and also pain resembling gall-stone colic for several years with apparent enlargement of the gallbladder.

Menstrual and marital history: Menses began at age of 13, regular up to last few years. Some dysmenorrhea, duration 3 to 5 days. Has had two children, normal deliveries. Laceration with the first and a phlebitis. Second delivery normal. No miscarriages. Menopause began one and a half years ago, very irregular, missed periods for six months sometimes.

The patient looks sallow, pale and emaciated, and is very nervous.

Chief complaints: 1. Uterine hemorrhage began suddenly March 10. Scanty flow since except for two days and then had another hemorrhage March 28. Had a great deal of pain with first two hemorrhages. Had to be packed to stop hemorrhage, and has been flowing off and on since.

2. Loss of weight, appetite poor, weakness and irritability.

3. Pain in lower right abdomen. Abdomen becoming enlarged a great deal.

Physical Examination: Patient wears glasses. Tonsils are present but not diseased. The teeth are in very poor condition; a number of roots present, and there is pyorrhea. The tongue is smooth and there is moderate atrophy of the papillae but not typical of primary anemia. There are a few râles in the base of the left lung and hypostatic congestion. There is a soft blowing murmur at the apex of the heart not

transmitted. The abdomen is distended and apparently a large cystic fluctuating mass extends to the right anterior of abdomen; tympany to posterior on the left, less on the right; dullness does not shift. Abdomen is not very tender over the mass.

Pelvic examination: Uterus enlarged four times its normal size, fixed and nodular. Small nodule masses in the cervix, and bleeds easily. Incompetent perineum.

Extremities: There is pigmentation of the right tibia from old hemorrhage of varicose veins, varicosity of both legs, bunions of big toes. Reflexes overactive.

Laboratory:

3-20-27. Urine normal.

4-16-27. Urine shows heavy trace of albumin, loaded with pus.

4-18-27. Albumin plus; clumps of pus.

4-23-27. Albumin plus; loaded with pus cells.

4-27-27. Albumin two plus, 30-50 h.p.f. Pus cells. Occasional blood.

3-29-27. Blood, hemoglobin 58%, declined to 39% on 4-27-27. Leucocyte 7,000, R.B.C. 3,160,000. Bleeding 2' 30", clotting 4'.

4-16-37. Leucocyte 16,500.

4-28-27. Blood Group IV.

X-ray examination: 4-5-27. Transverse colon, hepatic flexure and ascending colon and cecum are displaced markedly downward and to the left, apparently by smooth mass in right upper quadrant. No areas of obstruction, filling defect nor spasm.

4-6-27. Plate of abdomen shows barium in colon, same displacement to the left of colon by mass on right side, as noted before.

Preoperative treatment and progress: The patient progressed satisfactorily for a time, but was always very irritable, nervous, and hard to manage. The pulse and temperature were practically normal. Hypodermics of citrate of iron were given. 4-17-27 temperature 104.4°, pulse 140, patient coughing a great deal and had congestion of lungs with râles. The patient gradually improved, with temperature and pulse about normal so that operation was recommended and local anesthesia advised.

Operation 4-21-27, gallbladder normal. There was a large mesenteric cyst between the stomach and transverse colon containing about five or six quarts of thin serous fluid; irregular diverticulæ extending down between the stomach and colon; inner portion of the sac irregular and not uniform. Uterus four times normal, irregular, nodular and somewhat fixed. Possible carcinoma.

Operation: Removal of the mesenteric cyst. Sac dissected out except the base, which was cauterized to destroy the membrane, there being a great many large mesenteric vessels back of this part of the sac. A Penrose drain extended down to the cauterized area.

Progress after the operation was satisfactory for five days, the wound healing and moderate discharge from the cauterized area. A mild form of phlebitis developed in the left leg the fifth day after the operation. The patient became irritable, vomited some, and an involuntary action of kidneys and bowels be-



gan. Pulse 120, temperature 104° ax. Hypodermoclysis 1000 c.c. The patient became comatose next day; respiration shallow and rapid. Given blood transfusion of 400 c.c. of citrated blood, 4-29-27. The following day the temperature gradually rose to 106.2°, pulse 140, Cheyne-Stokes respirations and death at noon 4-30-27.

Important features of this case are the very large mesenteric cyst, perhaps giving gall-stone symptoms, complicated with probable carcinoma of the uterus; pyelitis, and anemia.

DR. A. SCHWYZER (St. Paul) presented the following cases and specimens:

1. Uterus from woman, 55 years old, who had complained of some bleeding from the uterus. The cervix was normal. When we curetted for diagnosis we were ready for hysterectomy. The cervix of the normal looking uterus was surprisingly easily dilated to No. 12 Hegar; this was suspicious. Instead of using a curette we entered the uterus carefully with a probang which brought material to light which made the diagnosis of carcinoma plain. Vaginal hysterectomy was done. This did not necessitate changing of the position of the patient, and allowed of a very clean removal of the uterus. A phenol-camphor gauze was pushed into the cervix and the uterus freed all around. The corpus uteri was presenting well in the posterior opening, but it was so soft that we did not dare to grasp it with forceps. This was fortunate as the carcinoma had gone practically to the very peritoneum. I show you the specimen only to illustrate how far advanced a carcinoma of the corpus uteri may be when the patient has no other signs than a very little bloody discharge, and further to emphasize the value in these cases of the vaginal procedure, from which many of us seem to have drifted away.

2. Specimen of uterus with multiple fibroids removed by vaginal route. The uterus with its many fibroids is quite large as you see; but its removal per vaginam did not give unusual trouble. The condition of these patients after the operation was as good as after a simple trachelorrhaphy.

3. The sack, or, if you choose, the travelling bag, in which I brought you these two large uteri, is the skin we removed in an enormous post-operative abdominal hernia. The woman, 67 years old, had suffered from this hernia for ten years. Usually when we operate for such a hernia we remove as little of the covering skin as we well can. Nevertheless, this large bag had to come away. There was a decubitus ulcer on the posterior surface. The hernia reached more than half way to the knees. The contents consisted of small and large intestines which were intimately adherent to the sack. In all there would have been about three feet of adherent gut if the different loops had been in one piece. Much of these adhesions had to be divided with the knife and at one place the small gut was opened, but of course sutured at once. A running catgut suture united what could be made out of peritoneum; then double looped 40-day catgut im-

blicated and the fascia and fine linen between made a firm closure of the fascia. A fine linen closed the skin. Seventeen days later we operated on this patient again for a complete inversion of the vagina which also dated back about ten years. There was no uterus or cervix, but the bladder was completely inverted outward. The urethra ran directly downward from the meatus and there was no posterior vaginal recess left as one usually sees in total prolapsus. The pouch contained intestines. After an extensive anterior colporrhaphy which reached the apex of the protrusion the same was done on the posterior wall, reducing the lumen of the vagina to about the size of a lead pencil. Both operations were done with local anesthesia. The patient is ready to leave the hospital.

4. The last case I wish to report was a mesenteric cyst in a lady 80 years old. She came from California with the diagnosis of a tumor of doubtful origin in the right side of the abdomen (so far as she knew). She brought a number of excellent skiagrams, which let us outline the mass as a rounded shadow of the size of a large grapefruit, directly below the right lobe of the liver. The kidney shadow is seen as superimposed in the inner portion of the tumor shadow. A pyelogram identifies it. The stomach is shown on other pictures to fill well; the duodenum, however, gives a narrow shadow as though compressed and pushed upward. The shadow of the ascending colon is to the outer side of the tumor. On palpation the large mass was surprisingly well movable laterally, but could not be moved up and down. It appeared fixed only at the upper pole, where it seemed to have its pivot. As it was not particularly tender and on account of its only point of fixation under the liver we thought it was an enormous hydrops of the gall bladder, though we had never seen one of such proportions.

Though the patient was eighty years old, we decided on operation, which was done yesterday in local anesthesia. She is in rather good condition this evening. Her symptoms date back three years and consisted of stomach distress. She had particularly much nausea the last two years, and the last two months it had become terrible, as she expresses it. She could hardly eat anything. No colic, bowels constipated. She comes from a long-lived family.

When the abdomen was opened no gallbladder could be seen; only fatty peritoneum presented and the tumor was felt underneath. We divided the peritoneal covering over the mass above the hepatic flexure. Only gradually did we recognize the topography. The tumor was yellowish and exceedingly thin-walled. Soon here and there a minute opening would let fluid escape, though we were very anxious to avoid emptying the sac before we had it peeled out, as the peeling out seemed to proceed best with the cyst at least partly filled. The walls were as thin as tissue paper; they looked necrotic but were not, as they were resistant enough to allow us to get the whole sac out with only about half of the fluid lost. This fluid was thin, turbid, yellowish, which was due to a great admixture of cholesterol. The wall, being so very thin, let the

turbid yellowish fluid shine through and this gave it the necrotic appearance.

Only a few ligatures were necessary and the abdomen was closed. The operation was done under local anesthesia; there was neither pain nor any untoward sign. Today, twenty-four hours after the operation, we had the patient out of bed to guard against lung trouble.

The location of the cyst was under the peritoneum below the pylorus and the first portion of the duodenum. The largest vessels were encountered at the pylorus, which was riding on the upper pole of the mass. After the removal of this mesenteric lymphatic cyst it could be seen that the area of the foramen of Winslow was lifted forward and that the origin of the growth was probably in the very root of the mesentery at the pancreas.

#### DISCUSSION

DR. A. E. BENJAMIN (Minneapolis): I should like to say something about vaginal hysterectomy. I am glad to hear Dr. Schwyzer say that he likes the vaginal hysterectomy; I think I do 60 per cent of these operations per vagina and nearly all with local anesthesia. They do well except sometimes in cases where you have a number of adhesions and perhaps remove a large tumor and have to split the uterus and take it out in pieces. I have favored this operation even for carcinoma, and think I have had better results; and by following the operation with deep x-ray and radium, one can do quite satisfactory work.

Now about the mesenteric cyst. We had all these problems to consider—was it hydronephrosis, gall bladder disease, or ovarian cyst? We first considered mesenteric cyst, and second ovarian cyst, but could not get an x-ray of the kidney and were not able to go through all the final details of examination on account of the unwillingness of the patient. She did not vomit after the operation for five days.

The meeting adjourned.

CARL B. DRAKE, M.D.  
Secretary.

#### BENZYL BENZOATE-L. A. VAN DYK OMITTED FROM N. N. R.

The Council on Pharmacy and Chemistry reports that L. A. Van Dyk manufactures "Benzyl Benzoate-L. A. Van Dyk," and two preparations of the drug, "Benzyl Benzoate-L. A. Van Dyk, 20 per cent," and "Benzyl Benzoate, 20 per cent, Aromatic." The Council omitted these preparations from New and Non-official Remedies because the advertising for these products is based on the enthusiastic reports published when benzyl esters were first used experimentally in medicine and the manufacturer did not make the revisions which were required to permit their continued recognition. (Jour. A. M. A. March 19, 1927, p. 944.)

## TRANSACTIONS OF THE MINNEAPOLIS SURGICAL SOCIETY

Meeting of April 7, 1927.

Meeting was called to order by Dr. E. C. Robitshek, President.

Dr. J. M. Hayes gave a demonstration of empyema cases and methods of treatment:

I have three cases of empyema which fairly well illustrate the different types of this condition.

*Case 1.*—Mr. F., aged 49, had pneumonia in 1916. Empyema followed but was not recognized at the time. Later the pus broke through the bronchus and he raised large quantities of pus. The physician suggested a thoracentesis but was dissuaded by one of his friends who had seen a lung abscess clear up in this manner. He raised pus for nineteen months and continued to get gradually worse. Finally in 1918 after the right lung had been completely collapsed, he had closed drainage instituted; later a Delorme decortication.

The lung expanded to about one-third normal and a partial collapse of the chest wall was done. There was still considerable cavity remaining. This was irrigated with Dakin's solution until it finally became sterile and was allowed to close in 1921. The cavity remained sterile and there were no symptoms present until three years later, when he again had an accumulation of pus in this cavity. Closed drainage was again instituted, but the patient has had a large bronchial fistula, and has continued to work without let-up, so that now there is merely an open tube in the lower angle of the cavity and there is no improvement taking place. An extra-pleural thoracoplasty would now be the treatment of choice but the patient does not want to stop work for operation.

*Case 2.*—Miss E., aged 32, had unilateral pneumonia in April, 1926. The pneumonia subsided after two weeks. A few days later empyema was recognized at the base of the left upper lobe. Closed drainage was instituted according to the method of Mazingo. Temperature subsided in a short time and the patient was allowed to be up. The cavity was irrigated the first week every two hours with Dakin's solution. In about six weeks the cavity had become so small and sterile that the tube was removed. The patient has been watched closely for a possible recurrence of pus but no evidence can be found. Rib resection was suggested to the patient after the second or third week but she preferred to take a chance on closure without rib resection.

*Case 3.*—Baby B, aged 2, had pneumonia in December, 1925. Empyema appeared synchronously with pneumonia but was not recognized early. When recognized, aspiration was done and later on, December 25, closed drainage was instituted. Temperature was 105 degrees at this time. This was a typical streptococcal pneumonia such as the adults had during the world war. The patient developed otitis media and suppuration of the cervical glands and a bronchial fistula. In spite of the bronchial fistula we irrigated with Dakin's

solution by laying the baby in such position that the fluid would reach the fistula last and with great care we soon learned to prevent forcing the solution into the bronchus. On account of the complication and consequent elevation of temperature the tube was left in longer than it ordinarily would have been. The tube was removed March 13, 1927. The child has had no symptoms of trouble since.

#### TREATMENT OF ACUTE EMPYEMA

Those who passed through the transitional stage of the treatment of acute empyema during the World War will agree with me that in no condition of medicine or surgery was the method of treatment more definitely established than in acute empyema. The history of the development of the treatment of acute empyema is a rather short but interesting story. Hippocrates recognized pus in the pleural cavity and evacuated it. His method of evacuation was not improved upon for 2,200 years.

In 1850 Wyman recognized the necessity of more continuous and adequate drainage and instituted such a method. Many methods of evacuating the pus have been proposed by various individuals.

In 1882, Sir Arbuthnot Lane first resected a rib to establish wide open drainage. Up to the time of the influenza epidemic, during the world war, this was the treatment of choice for acute empyema. In the strictly pneumococcal type early open drainage gave fair results, but in the streptococcal type, prevalent during the war, the results were disastrous. It was generally supposed before the war that practically all of these cases were pneumococci. At Mt. Sinai Hospital out of 574 pleural exudates examined, 133 showed streptococcal infection. Not many statistical studies were made before the World War. Moschoavitz says, "Many surgeons were laboring under a delusion that their mortality in these cases was much lower than it was."

In 1914 Wilensky tabulated statistically the results of 299 cases of empyema treated at Mt. Sinai Hospital. The mortality was 28 per cent. Peck and Cave studied the cases in Roosevelt Hospital from 1915 to 1920 and the mortality was 31.3 per cent.

Eggers, at Camp Jackson, South Carolina, studied 70 cases of empyema before the epidemic in 1917. The mortality was 27 per cent. In 1916, Lilienthal and Ware reported a mortality of 21 per cent in 38 cases in children under 12 years, and 20 per cent mortality in 28 adult cases. Cameron of Guy's Hospital in England reported a 70 per cent mortality in children during the first year and a 50 per cent mortality during the second year. Of 52 cases with early rib resection 39 died and 13 recovered. Holt reported 204 cases of empyema in children with a mortality of 74 per cent during the first year and a 50 per cent mortality during the second year.

Chandler says he doubts if primary rib resection is ever justifiable in children under four years. Cameron believes this type ordinarily found in children is the same as that found in adults during the World War. Early rib resection and a wide open drainage was the

method of choice at the beginning of the war. The results were so disastrous that the so-called empyema commission was established for the purpose of devising means for instituting more efficient treatment of this condition.

The work was first taken up at Camp Lee, West Virginia. With early rib resection and wide open drainage, the mortality was 48 per cent. With early aspiration and sterilization of the cavity and late rib resection the mortality was reduced to 4.3 per cent. Stone, with early rib resection and a wide open drainage, reported a series of 85 cases from October, 1917, to October, 1918, with a mortality of 61.2 per cent. A second series of 96 cases from January, 1918, to August, 1918, with early aspiration and late rib resection reduced the mortality to 15.6 per cent. With early aspiration, later opening up and cleaning out the cavity and doing a partial closure about the tube with Dakin's solution irrigations, the mortality was reduced to 9.5 per cent.

To be sure, the virulence of the bacteria had somewhat abated, which accounts to a slight extent for this reduction in mortality, but at the same time with the original method of treatment they were still getting from 45 to 75 per cent mortality in other camps. One camp after the other, as it adopted the principles established by the empyema commission, reduced its mortality as was done at Camp Lee by the empyema commission. Camp Dodge, Iowa, first reported a mortality of 64.8 per cent, later 5 per cent. Camp Lewis, Washington, at first reported a mortality of 25 per cent, later 17 cases with no mortality. Camp Bovee, Texas, at first reported a mortality of 45 per cent, later 10 per cent.

Rodman saw 240 cases between September 15 and October 10, 1918. His mortality was reduced by following the advice of the empyema commission from 45 to 10 per cent. He says that at first he was opposed to using Dakin's solution in the pleural cavity but became converted to its use during this time.

Dederich of Camp Pike reported 147 cases with a 48 per cent mortality at first. With the closed method of Mozingo he reduced his mortality to 7 per cent.

Sherrill of Camp Sherman reported a 50 per cent mortality with wide open drainage. With closed drainage his mortality was 5 per cent.

After the war many accurate statistics were kept which showed that a definite improvement in treating this condition had been established during the war.

Mozingo reported 114 cases with three deaths.

Munson reported 43 cases with no deaths, no secondary operation and no chronic cases.

Flint and Douglas of the Yale Clinic reported 102 cases with no deaths and no chronic cases.

Harloe reported 71 cases in children and adults with 8.4 per cent mortality.

Binnie of Boston reported 100 cases from the Boston City Hospital between 1920 and 1924. These were treated without much regard for the principles that were laid down during the war. A 13 per cent mortality resulted.

Heuer of Johns Hopkins suggests that complications arise usually as a result of inadequate treatment of the

empyema. In complicated cases he reported a mortality of 50 per cent. In uncomplicated cases the mortality was 6.5 per cent. As he says, early open drainage gives an inevitable pneumothorax, disturbs the mediastinal structure, lessens the vital capacity, and impedes the expansion of the lung.

Closed drainage, properly carried out, not only eliminates the above hazards but is more comfortable to the patient and prevents the case from becoming chronic.

The method of Mozingo gives us an ideal closed drainage if properly carried out.

As soon as empyema is suspected a needle of at least 22 gauge is inserted with a large syringe attached. If pus is present it may be aspirated for a few days in like manner or a tube should be inserted about the size of a No. 18F catheter. It should fit tightly so that the air cannot enter around it. Adhesive strips may be used to keep the opening air tight.

There should be no pull on this tube at any time. This would tend to loosen the tube and allow the entrance of air. After the cavity has been reduced by the closed method to about two or three ounces capacity, little harm would result by doing a rib resection and wide open drainage. At this time the lung and mediastinal structures have become fixed, so that a pneumothorax is of little consequence.

DR. H. B. SWEETSER: It would be interesting to have a few hours to discuss this paper of Dr. Hayes'. It is very astonishing to be told that the mortality from pre-war empyema was as high as he says. I had no such idea, and from my personal experience I feel fairly sure that my mortality was not so high as he says. Dr. Hayes has divided his statistics into three periods of time. His first period has to do with the beginning of the influenza epidemic, and during this period, influenza was, per se, a very fatal disease, and I think during this period empyema would have shown a high mortality under any form of treatment. In his second period, with closed treatment, the mortality was less, and in the third period it was very much less. This third period probably has to do with the period when the epidemic had burned itself out and was becoming less and less virulent. I think it is fair to say that in any epidemic of any kind, the early mortality is likely to be very high, and during this period any kind of treatment would have a high mortality. Possibly, if this closed method of treatment for empyema had been the recognized treatment before the war, I rather think that when we encountered the influenza epidemic of 1918, it also would have fallen down as thoroughly as did the open method. Dr. Hayes mentioned a period between 1920 and 1924 in which the closed method showed a very small mortality; possibly the explanation of that is that we had become more or less immune by that time and those who were not immune were dead.

I do not think that the open method must always be a resection of a rib. I can understand, when a person with a very bad case of empyema, with one pleural cavity entirely full of pus, and the lung compressed,

and the other lung doing all the work, that it is a very dangerous and frequently fatal treatment to put the patient to sleep and take time to resect a rib. If this method of treatment is carried out, I can understand the mortality must be high, for the operation itself contributes very largely. In such cases it has always been my custom either to aspirate the fluid several times and allow the lung to re-expand, or, with only local anesthesia, to thrust a pair of scissors between the ribs, and put in two small drainage tubes so the fluid will come out slowly. In children this same procedure may be carried out and the operation takes only a few minutes. It is very seldom that in children a rib resection is required at any time because there is ample space between the ribs to give sufficient drainage.

It is very difficult to convince me that it is dangerous to provide for free drainage of pus from the pleural cavity if it is done properly so as to prevent much aspiration of air.

To my mind, the important thing is to make an early diagnosis, to do as little as is necessary, to give sufficient drainage, and to do what you have to do quickly. When the compression of the lung has been relieved, if at that time the drainage is not sufficient, resection of a rib may be undertaken with comparative safety.

Thirty years ago, we were accustomed to put in two small tubes and repeatedly wash out the pleural cavity with antiseptic solutions, and the patient in many cases became worse. Now, if free drainage was made at the lowest point in the pleural cavity by resecting a rib, such patient almost always showed an immediate improvement.

If we are unfortunate enough to have another epidemic of influenza of a like malignancy as that of 1918, I fear that this new closed method of treatment of empyema will fail in the same manner as did resection in the epidemic of 1918.

DR. J. F. CORBETT: I think this is a very important subject. It calls to my mind almost the first day I spent in Rockefeller Institute taking that course which so many of us took at that time. We injected a small amount of Dakin's solution into the normal pleural cavity of a rabbit. We drew out a little of that fluid from day to day and watched the results. After a short period of time we got a little blood. Later we got necrotic tissue. Finally at autopsy the pleural cavity looked more like a fried egg. Then we found that where there was some exudate this did not take place, so that there must be in the application of Dakin's solution some indications and some contraindications. Personally when I have seen Dakin's solution put in and it showed the least tinge of blood I quit using it.

Most of the cases started at the Institute with the closed method (and they had had everything done) finally ended up with open drainage. It seemed to me that there was an appalling number of cases that had been cured once and were operated again.



I remember the principles of treatment that I have employed before the war when I was treating a good deal more empyema than I am now. It is important to get drainage from the very bottom of the cavity. Have a long tube that will drain out the bottom. With this simple procedure it seems to me that we get in a certain definite type of case results that have not been equaled.

DR. IVAR SIVERTSEN: During the war it was my good fortune to be with Dr. Max Ballin. It was also my good fortune to be surgeon for the empyema ward. Dr. Max Ballin is a very wonderful surgeon. He believed absolutely in the open method of treatment. I had eighty-nine patients at one time and I cannot believe we had a mortality up to 25 and 50 per cent. Our post-operative treatment depended largely upon the use of fat in the form of cream. We tried Dakin's solution without any apparent results. Two or three ribs were resected and in every case under local anesthesia. I use tube drainage for children but in the ordinary cases I believe in rib resection only.

DR. J. M. HAYES (closing): Dr. Corbett has suggested an important point. Dakin's solution should not be used on normal tissue, but the war demonstration hospital at Washington definitely proved the efficacy and safety of Dakin's solution in an empyema cavity.

Dr. Sweetser's remark is no doubt true. The virulence of the bacteria in the beginning of this epidemic was much greater than it was later, but it was definitely shown that, when the mortality at Camp Lee was reduced to 4.3 per cent by the methods instituted by the Empyema Commission, at other camps at the same time the mortality was still 45 to 70 per cent. We do not need another epidemic of this kind, as suggested by Dr. Sweetser, to prove the efficacy of this treatment, but what we do need is a closer study of the excellent work done by these men who were responsible for the rapid reduction of the mortality in the various army camps.

A case of calculi in the common bile ducts and gallbladder was presented by Dr. J. F. Corbett:

I would like to report this case because it is one of a good deal of interest from the standpoint of the formation of stones in the duct. This woman had had

gallstone attacks ever since she was sixteen years of age. At the time of operation she was fifty-four.

I operated on December 28, and on December 29 a tube that I had put in for drainage came out. There was bile in the stool and everything appeared normal when on January 4 a very large amount of bile drained through the opening and two days later the stools became clay colored. There evidently was a stone I had missed that came down and blocked the common duct. On January 8, the patient passed a stone by bowel and almost immediately after that bile returned to the stool. By the 15th her wound was healed.

The specimens show a hydrops of the gallbladder with cholesterol stones. The enormous square stones were in the common duct and extended from far up into the hepatic ducts to the ampulla of Vater. The entire biliary apparatus was packed full. These stones were black, like cannel coal, and seemed to be of different origin than those in the gallbladder. However, on section, every one of these huge black rectangular stones contained a cholesterol stone as a nucleus. Therefore, their origin must have been in the gallbladder. Gallbladder bile differs from liver bile in that it contains cholesterol in relatively large amounts.

It is true that stones have been found after the more or less complete removal of the gallbladder, but no reasonable explanation can be found except by assuming a vicarious function of the ducts, by assuming that a residual gallbladder has formed at the stump of the duct or that stones have slipped into the hepatic ducts at time of operation.

Dr. Ivar Sivertsen presented a paper entitled "Acute Suppurative Appendicitis: Factors in Mortality," which appears in this issue of MINNESOTA MEDICINE on page 472. The discussions will be found following the paper.

At the executive meeting following the scientific meeting, Dr. S. H. Baxter was re-elected a member of the Council for a term of five years.

Final approval was given of the plans for a prize essay contest in Clinical Surgery open to students in medicine at the University of Minnesota and to internes in Minneapolis hospitals.

THEODORE H. SWEETSER, M.D., Secretary.

#### BISMOGENOL NOT ACCEPTABLE FOR N. N. R.

The Council on Pharmacy and Chemistry reports that Bismogenol is the nondescriptive name applied to a suspension of the well-known basic bismuth salicylate in olive oil by E. Tosse & Company, Hamburg, Germany (E. Tosse & Co., Inc., New York, distributor). E. Tosse & Company are not the discoverers of bismuth salicylate, nor did they discover the therapeutic properties of this drug. For this reason the Council could not recognize the name "Bismogenol," and therefore found the product which is marketed under this name unacceptable for New and Non-official Remedies. (Jour. A. M. A. March 19, 1927, p. 944.)

#### ERGOSTEROL

The present evidence indicates that ergosterol is the precursor of vitamin D, that is, the parent substance from which vitamin D is formed. It is probable that the activity of cholesterol produced by irradiation, is due to the presence of ergosterol in cholesterol. The biologic tests with irradiated ergosterol have been astounding. A daily dose of 0.0001 mg. of irradiated ergosterol has cured and prevented rickets in rats kept on a rachitogenic diet. Irradiated ergosterol is the most potent antirachitic substance known, 5 mg. being equivalent to approximately 1 liter of a good cod liver oil. (Jour. A. M. A., June 18, 1927, p. 1969.)

## CASE REPORTS

Members are requested to report interesting and unusual cases for publication in this department. Many cases reported at hospital staff meetings and similar meetings are very instructive and worthy of publication.

### TETANUS WITH RECOVERY

#### REPORT OF CASE

EDWARD BRATRUD, M.D., F.A.C.S.  
Warren, Minnesota

Tetanus occurs very rarely in the Red River Valley. In fact, in over twenty-five thousand registrations at the Clinic, the following is our first case. From the oldest practitioners in the Red River Valley I have collected reports of two cases seen by Dr. Dunlop and one by Dr. Holte of Crookston. Gas bacillus infection has been encountered more frequently, however, and the Clinic has reports of seven cases all resulting fatally. Hence, my desire to report the following bacteriologically proven case with successful outcome.

H. E., female, aged 11.

*Family history.*—Mother has chronic fibroid phthisis of long standing. Fourteen brothers and sisters living and well.

*Previous history.*—Measles; operations, none. Patient ran a sliver into her left foot approximately thirteen days ago, the wound of which still persists.

*Present complaint.*—Headache of four to five days duration gradually becoming worse; difficulty in mastication, dysphagia, and stiffness of neck and jaws, rapidly increasing in last thirty-six hours; convulsion two hours ago.

*Examination* (11 p. m.).—Fairly well developed and fairly well nourished child small for her age. Patient is alert and looks bright. Facial muscles set. Pupils slightly dilated, reaction fair. Able to open her mouth only 1 to 2 centimeters. Muscles of jaw and upper neck are in tonic contraction. Patient swallows with difficulty. Talks fairly well. Rational. Muscles of chest, back and lower extremities moderately spastic.

Heart regular, pulse rather full. Lungs: respiration regular, somewhat labored. Normal otherwise. Abdomen negative. Back is in noticeable orthotonus. Extremities spastic.

Mid-dorsum of left foot presents an indurated scar not unlike that seen in some primary chancres with subcutaneous induration extending longitudinally 3 cm.

Temperature 100. Pulse 112. Respiration 24. W. B. C. 15,000, hemoglobin 90. Urine negative. Weight 52 lbs.

A diagnosis of tetanus following injury was immediately made and concurred in by other staff members.

#### PROGRESS OF DISEASE AND TREATMENT

Tetanus antitoxin—10,500 units intravenously and 4,500 units subcutaneously immediately.

August 20. General condition worse. Irrational at

times. Diplopia. 15,000 units antitetanus serum intravenously and 12,000 units intramuscularly. Treatment of wound: Reddish, swollen indurated area with necrotic center on dorsum of left foot completely excised to level of fascia. No signs of perforation of fascia. Moist peroxide dressing continuously to wound until healing occurred ten days later. Muscle spasm controlled by ether.

August 21. Condition essentially the same—possibly slight improvement. Takes liquid nourishment freely. 5,000 units antitetanus serum intravenously.

August 22. Condition the same. 10,000 units antitetanus serum intravenously. 1,500 units antitetanus serum subcutaneously. (Large amounts of serum available at this time but was outdated, otherwise would have been given.)

August 23. Condition worse. Orthotonos has progressed to marked opisthotonos. Opisthotonos so marked it requires three pillows for mid back. "Risus Sardonius" very marked. Had one convulsion. 15,000 units antitetanus serum intraspinally—ether anesthesia necessary. 20,000 units antitetanus serum intravenously. Very marked reaction for 24 hours.

August 24. 20,000 units antitetanus serum intravenously. General condition noticeably improved. Less rigidity. Able to flex legs somewhat. Headache and backache persist. Fluids, however, regurgitate through the nose.

August 25. 20,000 units antitetanus serum intravenously. Marked improvement as regards general condition and flexion of limbs. Opens mouth, masticates and swallows. Headache persists.

August 26. 20,000 units antitetanus serum subcutaneously. Marked improvement throughout. Able to take modified soft diet.

August 27. 10,000 units antitetanus serum intravenously. Improving.

August 27 to September 6, inclusive. Patient improved gradually, with headache and backache gradually clearing and on September 6 patient was able to walk about and be transported to her home.

Treatment in addition to that outlined above consisted briefly of absolute rest and quiet in darkened room, nourishing liquid diet and ample fluids by mouth, by rectum, subcutaneously and intravenously. For relief of spasms and convulsions—codein regularly, also choral, which proved very efficacious. Ether and morphin as conditions demanded.

Total amount of antitetanus serum—162,500 units. Attention is called to the weight of the child (52 pounds) in relation to the amount of serum used.

September 3, 1926, specimen of entrance wound examined by State Board of Health disclosed definite anaërobic spore-bearing tetanus bacilli.

Prognosis in tetanus depends greatly upon the length of incubation period.

Entrance wound in this case was left foot. Involvement, however, was bilaterally symmetrical.

Various authorities differ on the efficacy of intravenous, intrathecal, subcutaneous and intramuscular injections of serum but I believe the judicious use of the different routes most successful.

## PROGRESS

Abstracts to be submitted to Section Supervisors.

Members are urged to abstract valuable articles which they run across in their reading and send the abstracts to the physicians in charge of the respective sections. In order to avoid duplication it would be well to communicate with one of the section supervisors before the article is abstracted.

## MEDICINE

### SUPERVISORS:

F. J. HIRSCHBOECK,  
FIDELITY BLDG., DULUTH

THOMAS A. PEPPARD,  
LA SALLE BLDG., MINNEAPOLIS

### THE VALUE OF RENAL FUNCTION TESTS IN THE DIAGNOSIS OF EARLY NEPHRITIS.

Joseph T. Wearn (Medical Clinics of North America, March, 1927). Cushny's "Modern Theory" of urinary secretion is now generally accepted through the work of A. N. Richards and the confirmation of White and Schmitt.

Richards' observations on the capillary circulation in the frog, in which he proved that a large reserve of the glomeruli remain inactive during physiological excretion, is noteworthy. The kidney normally has only enough glomerular units in action at any given time to perform the work required of it. A quantitative increase in glomerular function is brought about by the use of diuretics, urea, salt, glucose and water.

The tests devised for measuring renal function may be placed in two groups: (1) Tests which are designed to measure the output of a substance in a given time, but which do not throw additional work or a strain upon the kidney—such as phenolsulphonephthalein, lactose and the iodid tests. (2) The second group includes those procedures which test the ability of the kidney to respond to sudden strain, by addition to the load of kidney excretion of foods in the diet, which in increased amounts create a functional strain, namely, proteins, salts and fluids. The most frequently used and the most useful of the latter tests are the water excretion test of Volhard—used extensively in Germany—and a modification of it, Pratt's test, used in this country. The urea concentration tests of MacLean and Addis, particularly the latter, are of clinical value. The water excretion test of Volhard and Pratt's modification thereof are more simple and yield the same results as the slightly more technical test of Hedinger and Schlayer and the modifications of Mosenthal and Christian. These latter tests are of value in estimating the efficiency of the reserve units of the kidney, which is not true of the P. S. P. test, since it places low grade strain upon the kidney and

does not in any way measure the reserve units. This latter test shows no material reduction until the kidney is greatly damaged or until the reserve units have been largely destroyed, at which time the clinical diagnosis is usually evident.

Foster, by his tests on patients with one kidney, has shown that the tests of Addis and Volhard are more delicate than those of Mosenthal and Christian. Positive confirmation of renal disease by the Addis test was of value in patients in whom the P. S. P. test and the blood nitrogen were normal. This would indicate that the more delicate tests are of value when the kidney function is reduced 50 per cent. The P. S. P. test does not show a diminution in the dye until approximately 66 per cent of the kidney tissue is absorbed.

The Addis test is performed by giving 30 grams of urea in a litre of water, and following this with two glasses of water per hour for three or four hours. The amount of secreting tissue is measured by determining the urea in the blood and in the hourly specimens of urine.

F. J. HIRSCHBOECK, M.D.

### LIVER DIET IN PERNICIOUS ANEMIA.

Geo. R. Minot and Wm. P. Murphy (Medical Clinics of North America, March, 1927). Since May, 1926, when the authors reported their first observations on the dietary treatment of pernicious anemia, with a diet particularly rich in liver, they have observed seventy consecutive cases, in which they believe they have proved that the red blood corpuscles in nearly all patients with pernicious anemia can be very markedly increased. An increase from 1,500,000 to 3,000,000 per c.mm. in about four weeks has been the rule, the rate of increase becoming slower as the blood count rises. In two months the red blood cell count is usually 4,000,000 per c.mm. The symptoms of spinal cord degeneration remain present. When the bone marrow has been severely affected, regeneration is much slower.

The diet should be carefully weighed and consist of the following foods:

1. Liver (essential).
2. Fruits.
3. Red muscle meat.
4. One to ten per cent vegetables.
5. A limitation of fats to 70 grams.
6. The avoidance of grossly sweet foods.
7. Limitation of milk to one-half a pint.
8. Starchy foods, such as cereals, potato and bread, to suit the individual tastes.

If the patient is unable to eat much food, liver and fruits should be used at first, gradually adding meats and vegetables, as the appetite improves. Starch should be continued, even though the red blood cell count remains high. It is believed that raw liver is more efficient than cooked liver. The diet is not as efficient when transfusion has been employed.

F. J. HIRSCHBOECK, M.D.

## SURGERY

### SUPERVISORS:

DONALD K. BACON,  
LOWRY BLDG., ST. PAUL

VERNE C. HUNT,  
MAYO CLINIC, ROCHESTER

ON THE MECHANISM OF THE TRANSPORTATION OF OVA. I. RABBIT UTERUS: Robert Kho-Seng Lim and Ch'i Chao (*Chinese Jour. Physiol.*, 1927, I, 175-198). Rabbits were used throughout the observations. Segments of varying lengths were resected from the uterine horn, and the cut ends reunited after reversing the intervening segment. Laparotomies were performed after two weeks and if all was well the animal was mated. For the purpose of control, segments of uterine horn were divided in other animals, and anastomosed without reversal.

Seventeen fetuses were produced by does with partial reversion of both horns, while six were produced by does with total reversion of both horns. It was concluded therefore that reversion of either a portion or the whole of the uterine horn offers no essential impediment to implantation in any part thereof. The reversal, however, with its attendant sequelae (adhesions, torsion, etc.) tends to diminish the frequency of pregnancy.

The authors concluded from their observations that ciliary activity probably plays no essential role in the transportation of the ovum in the horn. The transport of ova in the uterus must therefore depend chiefly, if not wholly, on the muscular contraction of the uterus. The presence of to and fro movements, persistalsis and anti-persistalsis in the uterus was believed to have been confirmed in these observations. Work has also been done on the question of ovum transportation in the oviduct, but has not progressed sufficiently to warrant publication.

HAROLD E. SIMON, M.D.

FRACTURES OF THE TRANSVERSE PROCESSES OF THE LUMBAR VERTEBRÆ: Robert H. Kennedy (*Annals of Surgery*, 1927, 85, 519-528). From the scarcity of references in the literature one would think this lesion either rare or of little moment. The author reviews the literature and reports ten cases.

The lesion may occur from direct violence or muscular strain, such as lifting, et cetera. Severe pain and tenderness were present in the lumbar region in all these patients but not so localized as to indicate the process fractured. Many of the patients were perfectly comfortably while lying flat in bed, but suffered pain on attempting to turn over or to sit up. Aside from those with associated spinal cord injury, all but one could stand. Resistance of the lumbar musculature was present in all patients. In two cases there was abdominal rigidity for forty-eight hours. Swelling of the soft

parts was mentioned in severe cases. In all cases, the normal back movements were restricted because of pain. There was no deformity except from the swelling of the soft parts.

The diagnosis can be definitely made only by radiograph: In the ten patients reported, there were thirty-two transverse processes fractured.

The length of disability in these cases is particularly important because the majority of them occur in the class of people covered by compensation insurance. It is generally conceded that the duration of disability should not be long, and may be materially reduced if the patient is not allowed to appreciate that any fracture is present. Except for the two cases with accompanying spinal cord injury, the hospital stay for these patients ranged from two to thirty-two days. At the end of this time they were able to walk but not to return to their usual work.

The treatment suggested includes plaster jackets, strapping and rest in bed. The author uses physiotherapy in the form of heat and massage, and the static machine is substituted for manual massage when the patient is allowed out of bed. The patients were strapped when indicated.

Bony union of the fractured transverse processes is definite in some of these cases. The majority of these patients should be at work within two months with practically no complaints referable to the injury.

HAROLD E. SIMON, M.D.

REVIEW OF 3,600 THYROIDECTOMIES: Joseph DeCourcy (*American Journal of Surgery*, 1927, No. II, 225-227). The ages of the patients varied from 17 to 84. Of the various types operated upon the diffuse parenchymatous type, of mixed adenomas and colloid, greatly predominated.

In regard to etiology, the greatest number could be traced to puberty, even through pregnancies. Heredity seemed to play a part, but the hypertrophies usually became apparent in the early adolescent period and in no instance could the typical fetal adenoma be found. The exophthalmic type appeared to be of sudden onset for the most part. It would occasionally develop upon an already existing colloid or adenomatous goiter. Worry and emotional strain seemed to be factors in the development of exophthalmic goiter.

Toxicity varied greatly in different cases. The most toxic were the exophthalmic cases in adults below twenty years. Recently there have been a large number of toxic colloid goiters occurring early in life and almost invariably these have had prolonged medication, principally iodine in the form of Lugol's solution. This iodination must be allowed to subside before operation or we may expect an almost uncontrollable reaction.

Colloid and adenomatous goiters with only slight toxicity require little if any preoperative preparation but as the toxicity increases greater care and judgment are required.

The exophthalmic cases are, of course, prepared with Lugol's solution. Great care should be exercised in



giving Lugol's solution over a long period, as it is, as far as we know, only a means of preparing exophthalmic cases for operation and must not be considered as a cure.

Postoperatively the patient is put in Fowler's position and is given proctoclysis, morphine, ice cap over the precordium and Lugol's solution. In severe toxic adenoma and exophthalmic cases the wound is left open for twenty-four to forty-eight hours.

The mortality during the past three years has been less than one per cent in all cases.

HAROLD E. SIMON, M.D.

THE RESULT OF ARTIFICIAL PNEUMOTHORAX TREATMENT IN PULMONARY TUBERCULOSIS WITH A SYNOPSIS OF 182 CASES: Rao Bahadur (Indian Medical Gazette, 1917, 62, 69-71). The Hippocratic School seems to have practiced artificial pneumothorax in pleurisy and other pulmonary conditions 2,000 years ago; in modern times it was first employed by Forlanini in 1894. The principle on which this treatment is based is the enforced rest given to the diseased lung by introducing air into the pleural cavity and collapsing the organ by equalizing the atmospheric pressure inside and outside the lung. The contraction of the lung-tissue not only results in the ejection of the toxic contents of the cavities and the bronchial tubes, but prevents the further accumulation of these products and hastens the process of fibrosis and repair.

In the author's cases about 250 c.c. of air was introduced during the initial operation and increasing amounts during successive refills, the maximum quantity given at any time not exceeding 800 c.c. and usually not exceeding 500 c.c. The intervals between the refills were slowly increased from 2 days to 3 weeks.

Ordinary medicinal and sanatorium methods were used in addition to the collapse therapy. Twenty-two per cent of the cases were arrested in stage II and III by pneumothorax treatment, while only 14 per cent of cases obtained the same benefit by ordinary methods. The progress of the disease was remarkably affected by the successive inflations. High temperature which had resisted weeks and months of ordinary treatment came down to normal or nearly so in a few days or weeks and the sputum became bacillus-negative in a remarkably short time.

This treatment is applicable to only about 5 per cent of cases. There is no object in applying it in the first stage unless ordinary treatment fails after 3 months. Unilateral cases, cases with less than one-third of the opposite lung implicated, cases of severe hemoptysis, pulmonary abscess, bronchiectasis, et cetera, come under the category of suitable cases, but extensive bilateral involvement, advanced diabetes, cardiac and renal complications and peritonitis and intestinal ulceration contra-indicate the employment of pneumothorax therapy.

HAROLD E. SIMON, M.D.

## PEDIATRICS

### SUPERVISORS:

CHESTER A. STEWART,  
LA SALLE BLDG., MINNEAPOLIS

ROY N. ANDREWS,  
MANKATO CLINIC, MANKATO

MEASLES PROPHYLAXIS BY USE OF CONVALESCENT SERUM, ADULT BLOOD OR SERUM. Samuel Karelitz, M.D., and Samuel Levin, M.B. (Amer. Jour. of Diseases of Children, March, 1927). It is the aim of this paper not only to increase the reports of results obtained with the use of convalescent serum, but also to emphasize the fact that whole blood, defibrinated or citrated blood, and serum or plasma obtained from adults who have had measles may be used prophylactically. Thus, a child may be protected completely for a short time, or may be given partial protection and permitted to develop a mild type of measles which results in a longer and more lasting, even permanent immunity. When it is safe to permit the child to have this mild measles, it is far more desirable than complete protection, which usually results in a very transient immunity.

The authors feel that the modified measles is usually innocuous and may be very much less contagious than the ordinary disease.

Children under 2 years, children suspected of tuberculosis, infants in hospitals or nurseries and others in whom measles would be a dangerous complication, should be treated for the purpose of obtaining complete passive immunization. All others would benefit more if given small doses or late injections of serum, which would lead to a mild, modified form of measles and to lasting, possibly permanent, immunity.

Convalescent serum has the greatest immunity titer from six to ten days after the temperature has reached normal. Adult donors should be free from tuberculosis, syphilis and other transmissible infections, and they must have had measles.

For complete protection of a child up to 3 years of age who has been exposed from one to four days, 5 c.c. of convalescent serum, 25 c.c. of adult serum or 75 c.c. of adult whole blood is given intramuscularly. If exposed from five to seven days, the same child should receive 10 c.c., 30 to 40 c.c. or 75 to 100 c.c. of convalescent serum, adult serum or whole blood, respectively. For children aged 3 years or older, the dosage for complete protection after exposure of from one to four days is 10 c.c., 30 to 40 c.c. or 75 to 100 c.c. If exposed from five to seven days, the same child should receive from 15 to 20 c.c., 30 to 50 c.c. or 100 to 150 c.c. For production of a modified form of measles, one third to one half of these doses is given.

R. N. ANDREWS, M.D.

## EYE, EAR, NOSE AND THROAT

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**BRAIN ABSCESS AS A COMPLICATION OF MIDDLE EAR SUPPURATION.** James Harper (Practitioner, February, 1927). The complete, classic, text-book picture of a case of brain abscess is found only in very late stages of the disease. A diagnosis, therefore, must be made early in order that surgical intervention may be of some value.

Chronic middle-ear suppuration is, or has been, present in the great majority of these cases; acute suppurative otitis causes about twenty per cent of them. Some patients will state that the discharge stopped just before the present serious symptoms developed. Rarely the middle-ear inflammation may have subsided while that in the antrum and mastoid cells has increased; such cases give no history of a discharging ear, and the drum may appear practically normal. Headache, dull and steady, is always present, and may be general or localized to the affected area. The temperature may be elevated (usually not over 102 degrees), normal or subnormal, being most often subnormal.

The pulse may be normal, but is frequently slower, due, not to the size of the abscess, but to inflammatory extension outside of the abscess capsule.

The mental condition, "slow cerebration," is often present; the patient answers question intelligently, but only after a considerable interval. The position in bed is not characteristic. Vomiting is not very frequent in intracranial ear-complications. Constipation is common, and the tongue is furred. Eye findings are not characteristic; anisocoria, muscular paralyses, inflammation and edema of the nerve head have been seen.

As to localization, temporo-sphenoidal abscess very often shows paralysis of the facial muscles of the opposite side, and later paralysis of the arm and leg. Speech disturbance—the inability to name objects—indicates trouble in the left temporo-sphenoidal area. Abducens paralysis and sensory or motor aphasia assist the localization. Individual ocular muscle paralyses would indicate a cerebellar rather than a temporal lobe lesion. Further, in cerebellar abscess we should expect to find an ataxic gait, a tendency to fall to the affected side, perhaps a positive Romberg, a spontaneous nystagmus to the same side, and inaccuracy in the pointing test. Also, in posterior fossa involve-

ment there may be stiffness and discomfort on pressure of the muscles at the back of the neck; moreover, there may be slow extension, after flexion, of the limbs on the affected side. Some or most of the symptoms above described are present in the active stages of brain abscess, though at times they may be indefinite even in these stages. However, in the latent stages there may be no symptoms whatever, or, if there are, they may be so vague as to point rather to a systemic disturbance. Not infrequently an unsuspected brain abscess is discovered while operating a mastoid. If the case is allowed to progress to a late stage, when a diagnosis can be easily made, other complications, such as meningitis, may prevent a successful operative result.

One symptom, already cited, is almost always diagnostic of temporo-sphenoidal lobe abscess: it is the appearance in a patient who has a middle-ear suppuration, of facial paralysis on the opposite side, followed by paralysis of the arm and leg.

VIRGIL J. SCHWARTZ, M.D.

**THE TREATMENT OF ANTRAL DISEASE BY SIMPLE TUBE DRAINAGE:** R. E. Mercer, M.D. (Annals of Otology, Rhinology and Laryngology, March, 1927). The author reports his results in a series of 230 cases of antral disease treated by simple tube drainage.

The operation is the same as ordinary aspiration of the antrum. Very little discomfort was complained of. The average time of leaving the tube in the antrum was eleven weeks. Cure may be delayed, but eventually follows the prolonged use of the tube. In one case cure was obtained after fifty-two weeks of use of the tube.

### CONCLUSIONS

1. A large number of antral diseases are not secondary to either disease of the teeth or other sinuses.
2. Simple aeration with drainage is effective in curing 85% of all cases.
3. Antral operative work is of little value in relieving asthma.
4. Antral drainage may be beneficial in relieving chronic bronchitis.
5. The antrum may be the source of infection in rheumatism, but less than 5% of antral disease patients complain of rheumatism. In those who do, an operation may be of decided value.
6. Postnasal dripping may be caused by antral as well as other sinus disease, and an operation may give much relief.

E. L. ARMSTRONG, M.D.

## BOOK REVIEWS

## BOOKS RECEIVED FOR REVIEW

- PRACTICAL OTOTOLOGY. Morris Levine, M.D., Assoc. Prof. of Otology, New York Post Graduate Medical School. 385 pages. Illus. Cloth, \$5.50. Philadelphia: Lea and Febiger, 1927.
- INTERNATIONAL CLINICS. Vol. II, 37th Series, 1927. Cattell, Henry W., A.M., M.D., and others. 308 pages. Illus. Philadelphia and London: J. B. Lippincott Co., 1927.
- LECTURES ON INTERNAL MEDICINE. Knud Faber, M.D. 147 pages. Illus. Cloth, \$3.00. New York: Paul B. Hoeber, Inc., 1927.
- PRACTICAL LECTURE SERIES. Second Series, 1924-1926. The Medical Society of the County of Kings, Brooklyn, N. Y. 590 pages. Illus. Cloth, \$7.00. New York: Paul B. Hoeber, Inc., 1927.
- DISORDERS OF THE NOSE, THROAT AND EAR. Aaron Roth, M.D., F.A.C.S. 238 pages. Illus. Cloth, \$2.50. Brooklyn: Physicians and Surgeons Book Co., 1927.
- THE HUMAN BODY IN PICTURES. Jacob Sarnoff, M.D. 120 pages. Illus. Cloth, \$2.00. Brooklyn: Physicians and Surgeons Book Co., 1927.

THE BELOVED PHYSICIAN—SIR JAMES MAC-KENSIE. R. McNair Wilson. \$4.00. 316 pages. New York: The MacMillan Company, 1926.

The inspiration of another great life of accomplishment in the medical profession is given in this biography of Sir James MacKensie, written by his friend and pupil, R. McNair Wilson, who says in the preface "For myself I owe to him all of that little that I know of medicine. I held him in love and reverence. I have written of him as a humble follower writing of his Master." He begins his story with a pen picture of Sir James as he appeared during his last years, sitting before the fire, with his visions of clinical research in his eyes, watching, undismayed, the inexorable advance of his fatal malady, angina pectoris.

He was a Highlander of ancient lineage and his father was a stern but just Scot. His mother was a gracious and kind woman who had a great influence upon his life and who made an ineradicable place in his memory by always placing a light in the window to light her son home. Because of his inability to memorize his lessons, he early became convinced that he was a dunce and this laid the foundation for one of his greatest assets—the modesty that followed him throughout life. Greatly discouraged, he left school at the age of fifteen and, attracted by the colored glass bottles in the window that promised romance within, he became an apprentice in a chemist's shop. The romance did not materialize and he soon regretted his step but continued with his work until at the age of twenty-one he refused a partnership in the business to go to Edinburgh to study medicine. When he had finished there he served as House Doctor at the Edin-

burgh Royal Infirmary and then went to Burnley as an assistant to a general practitioner. As soon as he started practice he was greatly troubled by his inability to interpret clinical symptoms properly and make accurate prognoses. He early acquired the habit of the detailed recording of all symptoms and patiently watched their outcome. By the sudden death of one of his young patients during delivery he was soon attracted to the study of diseases of the heart, particularly irregularities, and began making pulse tracings. In the midst of this busy work, at the age of thirty-four, he met and married Miss Frances Jackson, a step which brought him a lifetime of happiness, sympathy and understanding.

In his attempt to perfect pulse tracing he constructed a machine for the purpose (the first polygraph) which he carried about with him and used in farm houses and cottages throughout the country-side. He gradually formulated pioneer ideas of irregularities of the heart, particularly the difference between the innocent and dangerous types, but because they were considered too radical he was unable to get them accepted by the leading medical journals. At the age of forty-nine he published a book, "The Study of the Pulse," but it attracted attention only from foreign readers, a few of whom (William Osler among them) journeyed to Burnley to see his work. He then realized that to gain the attention of the authorities upon medicine in his own country he must carry his work to some large medical center, so at the age of fifty-four he left his safe practice and pleasant home at Burnley and went to London to attempt to deliver his message. The first year was very difficult with the heavy expense, practically no income and the death by meningitis of the younger of his two daughters. He utilized his spare time in writing books which brought him his long deserved recognition and he found himself famous with practically every honor, including knighthood, showered upon him. He soon found, however, to his great disappointment, that his fame was due to his mechanical contribution of the polygraph and not to his idea of getting at better interpretation of clinical symptoms as the key to the diagnosis of disease. He continued however, and under his direction the electrocardiograph in the hands of Lewis was perfected and he found himself the unwilling center of a "school" which gave all its attention to research in physiology and pathology with the mechanical side of diagnosis emphasized and the question of the individual patient forgotten. This was interrupted by the World War, when he devoted himself to the question of estimating the heart strength and when he had a hospital dedicated to the work. As soon as this was over he decided to leave the bewildering "school" which he had unwittingly founded and go back to general practice, because he felt that this most important phase of medicine was being neglected. He chose St. Andrews as the field for his labors. Here he cooperated with the physicians already there and opened an out-patient clinic for out-of-town physicians and their patients, forming the foundation for the development of the St. Andrews Institute of Clinical Research (now

known as the James MacKensie Institute of Clinical Research). To this enterprise Sir James gave unstintingly of his time, thought and money, even returning to consultation practice to obtain additional funds for it. Very soon after this work was begun he realized that he was stricken with angina pectoris, but he proceeded with his work and redoubled his efforts so that he might accomplish as much as possible before the disease curtailed his activities. He accomplished his aim by finishing the proof reading of his big book and the review of the work of the Institute published as "The Basis of Vital Activity" before his death, Jan. 26, 1926.

Mr. Wilson has succeeded in giving a faithful portrayal of the monumental work of one of the great leaders in the medical profession. He gives the reader an intimate detailed account of the ideals in the mind of the great man as well as the great work accomplished and the reader sees Sir James as a man to be respected and admired. But by omissions of all personal details, he fails to give the reader a picture of Sir James himself, a man to love. He attempts this at the last when he says: "A man rich in achievement and full of service, yet with the eyes of a boy. He was a great man of science, a great observer, a great thinker, a great controversialist. But over and above all these things he was a great man, a great friend, true in heart, noble in spirit, dauntless in courage."

This book should be read by every physician and to him it will bring inspiration and knowledge that the great contributions to science are frequently made, not by highly trained research workers in elaborate Institutes, but by humble workers leading lives filled with busy routine but with hearts and minds fired by the divine spark of desire to find truth.

MARGARET WARWICK, M.D.

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**AMERICAN MEDICAL ASSOCIATION DIRECTORY, 1927.** 2,575 pages. Cloth, \$15.00. Chicago: American Medical Association, 535 North Dearborn Street, 1927.

For more than twenty years the American Medical Association has been publishing a directory of the medical profession. Ten editions have appeared, the last one (1927) being just off the press.

The first edition (1906) contained 128,171 names of physicians in the United States, its dependencies and Canada. The new Tenth Edition includes 164,002 names. There is an increase of 2,644 over the previous edition. If the Directory were merely a list of names and addresses of physicians it would not have great significance. That information is valuable, but of far greater value is the fact that the Directory gives proof of the right of each physician listed to practice medicine—namely, time and place of graduation and year of license. In addition, society membership, specialty and office hours are included. Capital letters indicate those who are members of their county medical society, and a special symbol follows the names of those who are Fellows of the American Medical Association.

The information concerning hospitals and sanitariums of the United States is another valuable and extensive feature. Descriptive data appear following the names of 7,816 hospitals and sanitariums, such as type of patients handled, capacity, and name of superintendent or director.

The list of physicians in each state is preceded by a digest of the laws governing medical practice in that state; members of licensing board; state board of health; names of city, county and district health officers; officers of constituent state associations and component county and district medical societies. The book, in short, is one vast source of reliable data concerning the personnel of the medical profession and the institutions and activities closely related to it.

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